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PAN-AMERICAN EXPOSITION, BUFFALO, N.Y.,
May 1 to November 1, 1901.

MINERAL EXHIBIT

OF THE

PROVINCE OF ONTARIO

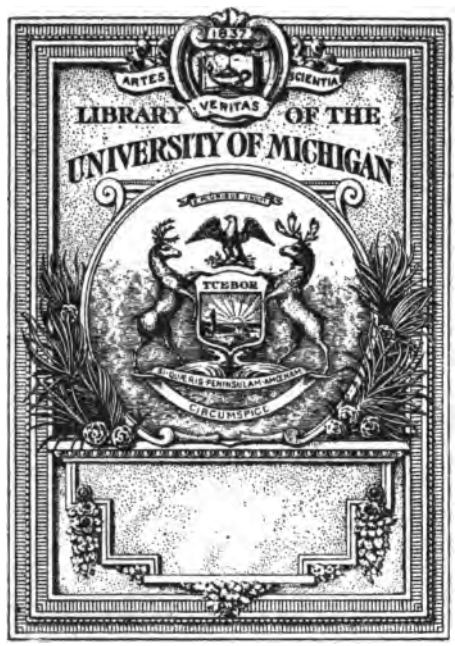
COLLECTED AND PREPARED BY THE

BUREAU OF MINES,

THOS. W. GIBSON, Director.

DESCRIPTIVE CATALOGUE.

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON,
Printer to the King's Most Excellent Majesty.
1901.



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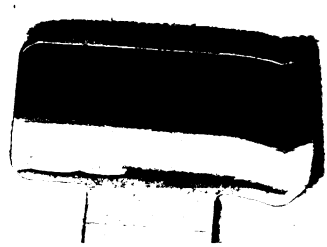

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GOVERNMENT OF ONTARIO

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Attorney-General :.
HON. J. M. GIBSON.

Minister of Education :
HON. RICHARD HARCOURT.

Minister of Agriculture :
HON. JOHN DRYDEN.

Commissioner of Crown Lands :
HON. E. J. DAVIS.

Provincial Secretary :
HON. J. R. STRATTON.

Commissioner of Public Works :
HON. F. R. LATCHFORD.

Superintendent of Mineral Exhibit :
FRANK. N. SPELLER.

PREFACE.

The collection and preparation of an adequate and representative Exhibit of the Minerals of Ontario is not an easy task, distributed as the mineral wealth of the Province is over a vast area and in many cases situated at a distance from means of communication. When the Commissioner of Crown Lands, Honorable E. J. Davis, decided to accept the invitation of the Pan-American Exposition authorities and make a display of Ontario's minerals, the task naturally devolved upon the Bureau of Mines. Little over four months remained before the opening day of the Exposition—the first of May—and the season of the year, when many properties not in active operation were covered with snow and when in the districts remote from railways transportation was difficult, if not impossible, interposed serious obstacles. To these obstacles must in the main be attributed the shortcomings of the Exhibit; but notwithstanding some deficiencies, it can fairly be claimed for the collection that in extent and variety it is a representative one. All, or nearly all, of the chief mines and properties now being actually worked have contributed to the display, and it is believed that no important department of the mineral industry is unrepresented. Most of the specimens have been collected expressly for the Exhibit, but in some instances where suitable samples could not otherwise be obtained in time for the Exposition, the collections of the School of Practical Science, Toronto, and those of one or two private owners have been drawn upon.

One principle kept steadily in mind in assembling the Exhibit was to place on view samples of ore and mineral taken as far as possible from working properties, or at all events of average composition and richness, rather than picked specimens which might be more attractive from a sight-seer's point of view, but which would not properly represent the body of ore or mineral from which they were taken. It was thought that well-informed visitors would prefer such a collection, as calculated to convey a correct impression of the nature and value of the mineral deposits of Ontario, to one made up of rich and handsome samples whose very richness would tend to cast doubt upon their representative capacity.

Hardly less important than the character of the samples comprised in such a collection is their size. First-class hand specimens may be obtained from almost any deposit of mineral, whatever may be its grade or value; but where it is desired to show the real nature of a vein or lode the only convincing proof—so far as such proof can be given by samples at all—is the production of specimens large enough to be unmistakably characteristic of the whole. The adoption of this principle greatly increased the difficulties of collecting the Exhibit, but in the eyes of practical men has much enhanced its value. Wherever practicable, large, even bulky specimens have been procured especially from working mines, so that not only might the quality of the mineral worked be clearly shown, but that it might also be made apparent that the properties from which these massive specimens were taken had arrived at a stage of development demanding the use of suitable mining equipment and appliances. Further, there is no doubt that the mind is impressed through the eye, and the sight of a large mass of workable ore insensibly conveys the impression that the lode or deposit from which it is taken is of corresponding size as well as quality. The foregoing remarks will explain the presence in the collection of many large blocks of the ores of copper, copper-nickel, iron, gold, zinc, corundum, graphite, felspar and other minerals.

Little effort has been put forth to make the Exhibit scientifically complete, hence some varieties of crystals and probably a few minerals not of much com-

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mercial importance may be missed from the collection, the aim being to emphasize the practical, rather than the purely mineralogical aspects of the Exhibit.

It is due to the mining companies and mining men of Ontario to say that almost without exception they responded cordially to the invitation to assist in making the display as complete as possible, and in many cases they were willing to incur considerable expense in order to properly represent and install their products. Without in any way detracting from the co-operation of other companies, mention may be made of the magnificent exhibit of copper-nickel ores, matte, refined metals, metallic solutions, etc., to which the main contributors were the Canadian Copper Company, the Nickel-Copper Company, of Hamilton, and the Orford Copper Campany. Probably a larger and better demonstration of the copper-nickel resources of Ontario has not yet been made. The Lake Superior Power Company in iron and nickel ores and products, the Rock Lake Mining Company, the Bruce Copper Mines, the Canadian Corundum Company, the Ontario Graphite Company, the Hamilton Steel and Iron Company, the Canada Iron Furnace Company, the Canadian Goldfields, Limited, the Peat Development Syndicate, the Imperial Oil Company and many others, have in their respective products greatly assisted in making the Exhibit a success.

The space allotted to Ontario in the Mines building, while advantageous in point of location, had the disadvantage of being divided diagonally by one of the leading aisles. The chief difficulty in installing the Exhibit lay however in the smallness of the area. Much of the material collected had in consequence to remain unused, but by the kindness of the authorities permission was obtained to make use of the platforms at the north and west entrances, where some of the largest blocks of mineral are on view.

To the Canadian Pacific and Canadian Northern Railway Companies are due hearty thanks for free transportation of specimens from Toronto, where the collection was assembled before being forwarded to Buffalo.

The actual work of collecting, classifying and installing the Exhibit was mainly performed by Mr. Frank N. Speller, B.A.Sc., of Toronto. Mr. Speller was assisted to some extent by Mr. W. E. H. Carter, B.A.Sc., Secretary of the Bureau of Mines, who also for the most part compiled the Catalogue of the Exhibit.

MIKADO GOLD MINE, LAKE OF THE WOODS: GENERAL VIEW OF WORKS.

[3] HAMMOND REEF GOLD MINE, UPPER SEINE RIVER: MILL (40 STAMPS).

BELMONT GOLD MINE, HASTINGS COUNTY : MILL (30 STAMPS).

[4] GLASS REEF GOLD MINE, MANITOU LAKE: STAMP MILL.

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817	34	878	9	932	80, 82	963	43
818	34	879	9	933	80	967	24
818a	34	880	43	934	80	980	70
819	34	881	46	935	46	981	71
820	34	882	46	936	67	982	83
821	34	883	46	937	67	983	84
821a	34	884	46	941	73	984	83
822	46	885	46	942	37	985	60
824	70	886	46	943	89	986	90
825	70	887	75	944	5	987	90
826	70	888	20	945	5	987a	90
826a	70	890	47	946	5	990	10
826b	70	891	26	947	79	991	81
827	65	892	26	948	42	991a	81
828	75	893	26	948a	42	1000	21
829	18	894	26	949	67	1001	21
830	55	896	36	950	54	1003	21
830a	55	897	36	951a	35	1004	21
830b	55	898	36	951b	35	1005	21
830c	55	899	36	951c	35	1006	21
830d	55	900	36	951d	35	1007	21
830e	55	901	36	951e	35	1008	21
831	51	902	36	951f	35	1009	21
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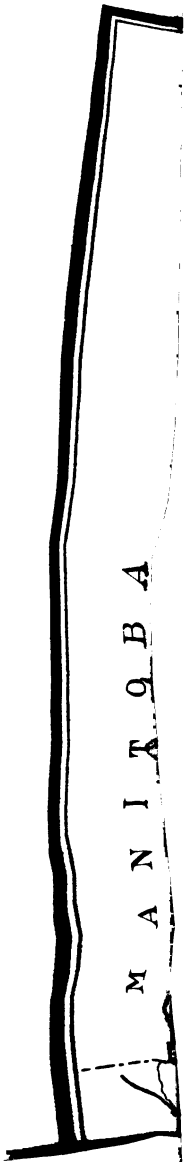

MANITOBA

METALS AND THEIR ORES.

GOLD.

The first discovery of gold in Ontario which attracted attention to this Province as a probable mining field was made about 1865 in the County of Hastings, but no permanent development followed. In 1883 discoveries were made in the Lake of the Woods region, and active operations were begun, only to be followed a year or two later by a depression which shortly resulted in the abandonment of the properties; at the time apparently for good. After a year or so fresh discoveries were made and interest was re-awakened; since which time there has been a constant enlargement of the known gold-bearing area. Finds of new gold territory have marked almost every year, and 1900 has been no exception, for two new fields have been opened up, with such promise that a stamp mill is already installed in each. These regions are Sturgeon Lake, north of the Canadian Pacific Railway, and Eagle Lake, south of the same line, both in north-western Ontario. In the eastern mining field, centred in Hastings county, the industry has within the last three years rapidly advanced to a very solid basis, both old and new properties having been thoroughly tested by development with the result that during the past year or two large and extensive reduction plants have been erected.

Most of the auriferous ores of Ontario are free milling, the gold being extracted chiefly by crushing and amalgamation followed when advisable by a separation of the sulphides by concentration. The proportion of concentrates is in the majority of cases small, but as the sulphides are generally of high value and the extra cost of extraction is slight, concentrating machinery is usually employed. In other cases after amalgamation the pulp is subjected directly to the cyanide treatment, and this for some ores proves to be a very efficient process, the most notable example being at the Mikado mine, Shoal lake.

The arsenical gold ores in Hastings county are for the most part refractory, yet are not suitable for treatment by smelting on account of the loss of the valuable arsenic occasioned by that method. All the various wet methods were tried with unsatisfactory results, until the application of the new bromo-cyanide solution by the Sulman-Teed process which has proved quite successful.

Of the large number of gold properties in the Province, 34 have stamp mills, these ranging in size from the two-stamp test mill to the 40-stamp battery, the number of stamps amounting in all to 460. The most important producers during the past year have been the Sultana, Mikado, Sakoose, Golden Star, Olive, Deloro, Belmont and Atlas Arsenic mines. The production of gold in Ontario ending December 31st, 1900, amounts to $1,187,161.00. The following table gives the number of mines which have attained in their underground workings a greater depth than 100 feet:

Mikado mine,	depth	between	800	and	900	feet,
Sultana	"	"	"	500	"	600	"
3 mines of		"	"	400	"	500	"
1	"	"	"	300	"	400	"
10	"	"	"	200	"	300	"
20 to 30	"	"	"	100	"	200	"

The deepest mines are the largest producers. The gold mines of Ontario, with one or two exceptions, are opened up by means of shafts instead of, as in mountainous regions, by tunnels.

Lake of the Woods.

This region lies at the west end of the Province, the Lake of the Woods forming part of the boundary between Ontario and Minnesota and Manitoba. Its port of entrance, as well as that for the adjoining smaller districts, such as Shoal Lake, Whitefish Bay and Sturgeon Lake, is Rat Portage, situated at the north end of Lake of the Woods, and from here in summer communication is maintained with the different mines by several steamboat lines and many private craft; in winter the lake freezes over and the various routes are travelled regularly by stages. The Canadian Northern Railway's southern or Ontario and Rainy River branch, completed last year from Winnipeg as far as Beaver Mills on the Rainy River, touches the south shore of the Lake of the Woods at the port town of Warroad in Minnesota and from here also, or from Beaver Mills, 10 miles from the lake, connection may be made by boats to the various mines.

This is eminently a region of free milling auriferous quartz, though at a few mines the veins are heavily mineralized with sulphides and may require other treatment than the now universal one of stamp milling.

The Sultana is the most noted mine, being, as it is, the pioneer of the gold mining industry in this region. The property was patented in 1888, and after considerable prospecting of the ledges actual mining began in 1892 and since has been continued almost without intermission to the present time. A 10-stamp mill was erected in the fall of 1892 and ran until 1897 when a complete new 30-stamp plant with roasting and chlorination building and machinery for treatment of concentrates was built to replace the old reduction works.

The Shoal Lake district lies to the west of the Lake of the Woods, and receives its name from the large body of water of the same name which forms an arm of the main lake. The most important property here is the Mikado. During the fall of 1900 many additions and improvements were made at this mine, both to the reduction plant and surface works and underground. A new skiproad runs down through the old stope about 850 feet to the bottom, and suitable hoisting machinery has been installed to operate the same. A crusher house 70 feet high was erected beside the stamp mill, and the ore, after being dumped from the skip at the top, works automatically through all the processes of crushing, recrushing, stamping, amalgamation and cyanidation. The battery consists of 30 stamps and the cyanide plant of eight 40-ton vats. The incline shaft or skiproad is being rapidly sunk from the above depth down through the continuation of the pay chute.

The other smaller districts adjacent to the Lake of the Woods are Whitefish Bay to the southeast and Sturgeon or Deer Lake to the east.

27 Quartz, with visible gold and galena.
Bureau of Mines.

30 Quartz and pyrite with visible gold.
30a Quartz with pyrite.
Regina mine, Regina bay, off Whitefish bay, Lake of the Woods.
Bureau of Mines.

52 Pyrite in quartz Lake of the Woods.
Wm. Margach, Rat Portage

57 Pyrite in quartz. Black Jack mine, Big Stone bay, Lake of the Woods.
Bureau of Mines.

59 Auriferous quartz Regina mine, Regina bay, Lake of the Woods.
Bureau of Mines.

109 Auriferous quartz Bullion mine, location P 263, about 3 miles northeast of Rat Portage.
Geological Survey.

75a Auriferous quartz showing free gold. From south stope.
75b do do do From north stope.
75c do do do From tunnel level, 210 feet in.
75d do do do From second level, south 105 feet.
75e do do do From shaft on West vein.
75f do do do From main shaft at 145 feet depth.

Regina mine, Regina bay, Lake of the Woods.
Bureau of Mines.

118 Auriferous quartz Scramble mine; a large body of low grade ore.
Geological Survey.

119, 185, 543 Auriferous quartz Triggs mine, 2½ miles east of Witch bay, Lake of the Woods.
The Triggs Gold Mining Company of Ontario, Limited, Rat Portage.

120 Auriferous quartz Victory property, locations McA 41 and S 48, east of Witch bay, Lake of the Woods.
Bureau of Mines.

80 Auriferous quartz From stope on 130 foot level.

122, 180, 542 Auriferous quartz

542a Raw concentrates. From stamp mill.
542b Roasted concentrates Ready for chlorination.

Sultana mine, 7 miles southeast of Rat Portage on Bald Indian bay. This property has been running profitably for many years. The first plant built in 1892 comprising 10 stamps was increased in 1897 to 30 stamps with the addition of roasting and chlorination buildings for the treatment of concentrates. The underground workings have reached a depth of nearly 600 feet and laterally extend some 1,200 feet with large stopes at various points.
Sultana Mine of Canada, Limited, London, Eng.

61 Auriferous quartz.
578 Auriferous quartz carrying bismuthinite.
555 Quartz showing free gold
140 Auriferous pyrite and quartz From ore chute in No. 1 vein.
141 Auriferous quartz From fourth, fifth, sixth and seventh levels, No. 1 vein.
141a Slag From smelting the gold bullion.
141b Zinc shavings Before and after the precipitation of gold therewith from the solutions in cyanide process.

Mikado mine, Bag bay, Shoal lake. This is one of the large mines of western Ontario. A battery of 30 stamps with cyanide plant for treatment of tailings is in steady operation. The mine has reached a depth of about 900 feet on the incline and 425 feet vertically.
Mikado Gold Mining Co., Limited, London, Eng.

142 Auriferous quartz Shoal lake.
N. McMillan, Mikado mine, Rat Portage.

151 Auriferous quartz and felsite. Cameron Island mine, Shoal lake. These samples include quartz from a rich 6-inch vein; from a recently discovered 1-foot vein; and from the main vein, principally from the lower levels at 130 foot depth. A piece of country rock is also shown. A complete hoisting and air compressing and drilling plant have been installed on the island.
Cameron Islands Mining & Development Co., Limited, Toronto.

152 Auriferous quartz Bullion No. 2, locations D 233 and 389 near Shoal lake and adjoining Mikado mine.
Bullion Mining Company of Ontario, Limited, Rat Portage.

156 Auriferous quartz. Black Hawk locations near Rat Portage. There are several veins on the property, from 10 to 30 feet in width prospected to a depth of about 10 feet; also a large dyke of quartzose schist 70 feet in width carrying quartz stringers said to be auriferous.
The Black Hawk Gold Mining Co, Cleveland, Ohio.

182 Auriferous quartz. Wimor property, location P 289, 6 miles east of Rat Portage. A shaft has been sunk 85 feet and a little test-pitting done.
Rainy River Gold Mining Co., Rat Portage.

183 Auriferous quartz. Black Sturgeon mine on Black Sturgeon lake, 10 miles northeast of Rat Portage.
Bureau of Mines.

334 Auriferous quartz. Location E 352, Gold Centre, north shore of Clytie bay, Lake of the Woods. Development work consists of stripping and testpitting the vein which is 4 feet wide and composed of blue and grey quartz and is said to assay $21 60 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

335 Auriferous quartz. Location E 306, north shore of Clytie bay, Lake of the Woods. The vein which is 15 feet wide has been prospected by a shaft 50 feet deep, and the average of 25 samples is given at $12.50 in gold per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

336 Auriferous quartz. Location C R 26, north of Clytie bay, Lake of the Woods. The property contains a number of parallel veins of which the widest is 12 feet. The average of 6 assays from surface samples is given as $56.10 gold per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

340 Auriferous quartz. Location C R 14 near Crow Duck lake. An assay of the quartz is given as $26.00 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

340a Auriferous quartz. Location E 336, near Crow Duck lake. An assay of the quartz is given as $20.50 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

341 Auriferous quartz. Location C R 20, near Crow Duck lake. An assay of a sample of the quartz is said to give $33.10 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

342 Auriferous quartz. Location E 338, on the north shore of Rush bay, Lake of the Woods. An assay of the quartz is given as $3.80 in gold per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

343 Auriferous quartz. From group of locations E 340, 343, 344 and 345 south shore of Lake of the Woods. The average assay of the ore represented by these samples is given as $6 40 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

344 Auriferous quartz Location E 344 south shore of Lake of the Woods. A surface sample assays $2.80 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

345 Auriferous quartz Location E 345 on the south shore of Lake of the Woods. Sample is from the surface and assays $2.80 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

346 Auriferous quartz Location C R 24, known as Gossan Point, near Wylie bay, Lake of the Woods. Samples assay $24.60 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

347 Auriferous quartz From group of Locations C R 21, 22 and 23, near Wylie bay, Lake of the Woods. Samples assay $20 20 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

349 Auriferous quartz. Locations E 357 and 358, north of Clytie bay, Lake of the Woods. Samples assay $20 60 per ton.
Collection of The Mines Contract & Investigation Co. of Toronto, Limited.

552a Quartz showing free gold. Cornucopia mine, Shoal lake, Lake of the Woods.
Bureau of Mines.

755 Quartz showing free gold. Otonabee mine, locations F M 175 and 176 south of Whitefish lake, Lake of the Woods.
A. T. Fife and G. A. Stethem, Rat Portage.

944 Auriferous quartz showing free gold. Gold Panner mine, location M H 230, Sturgeon lake, Lake of the Woods.
Gold Panner Mining Co. of Ontario, Limited, Rat Portage.

945 Auriferous quartz. Homestake mine, Lake of the Woods.
Bureau of Mines.

946 Auriferous quartz Sirdar mine, Shoal lake, Lake of the Woods.
Sirdar Mining Co., Toronto.

756 Auriferous quartz. John Bull claim, Star lake, Manitoba boundary.
Bureau of Mines.

735 Auriferous pyrrhotite carrying copper and nickel. From a location on Hawk lake just over the boundary in Manitoba and two miles from the C.P.R. station of Ingolf, Ont. The vein on the property is said to be 18 to 20 feet wide and traceable for several thousand feet, and to be in contact between granite and trap rocks. The vein matter is composed of quartz, said to carry paying values in gold, silver, copper and nickel.
Neil Martin, Winnipeg, Man.

1237 Auriferous quartz From Lake of the Woods near Rat Portage, assaying $137.00 per ton.
Collection of F. N. Gibbs, Port Arthur, Ont.

29 Auriferous pyrite in quartz Lake of the Woods.
Bureau of Mines.

222 Auriferous chalcopyrite Regina mine, Regina bay, off Whitefish bay Lake of the Woods.
Bureau of Mines.

Lower Seine River

This includes the country along the lower portion of the Seine River and in the district about Shoal, Bad Vermilion and Little Turtle lakes. To enter the region a roundabout steamboat trip is necessary from Rat Portage down Lake of the Woods to and along Rainy river and lake into Shoal lake to Mine Centre. However, by the end of this year, 1901, it is expected that the new Ontario and Rainy River Railway, a branch of the Canadian Northern, which passes throughout the length of this region and about five miles north of Mine Centre, will be completed and in operation and will thus afford convenient and much needed outside connection. The present high transportation charges have retarded the mining industry in this locality, in some cases to such an extent that work has been temporarily suspended at the mines pending completion of the railroad and the consequent reduced cost of operation.

Between Bad Vermilion and Shoal lakes an extensive boss of protogine outcrops, and in this many auriferous quartz veins have been found and worked, constituting the main mines of this region, such as the Golden Star (the quartz vein here lying in a dyke of felsite in the granite), the Foley, Lucky Coon, Randolph, etc. To the east and west mining is pretty well confined to a narrow stretch of Huronian rocks, along and through the course of which the Seine and Little Turtle rivers flow.

6 Auriferous quartz.
Bureau of Mines.

94, 179 Auriferous quartz with galena and iron and copper pyrites. Golden Star mine, Bad Vermilion lake.
Aubrey White, Toronto.

114 Auriferous quartz and sulphides. Golden Star mine, Bad Vermilion lake.
Geological Survey.

113 Auriferous quartz. Golden Crescent mine, locations A D 2, 3 and 4, Bad Vermilion lake.
Geological Survey.

177 Auriferous quartz. Decca mine, near Mine Centre. Last year a 10-stamp mill was erected on this property.
Bureau of Mines.

184 Auriferous quartz. Gold Bug mine, situated on Little Turtle river, 20 miles east of Little Turtle lake.
Gold Bug Mining Company, Limited, Mine Centre, Ontario, and West Superior, Wisconsin.

188 Auriferous quartz. Lucky Coon mine, ½ mile south of Bad Vermilion lake. There are five shafts sunk on the property all in bodies of quartz, and a 10-stamp mill has been erected.
Lucky Coon Gold Mining Company, Limited, West Superior, Wisconsin.

95 Pyrite in quartz.
577 Quartz showing free gold.

918	Auriferous quartz	and	sulphides	Galena vein.
919	do	do	do	Daisy vein.
920	do	do	do	Lucky Joe vein.
921	do	do	do	No. 5 vein.
922	do	do	do	Gold Panner vein.
923	do	do	do	East vein.

924 Country rock.
Foley mine, Shoal lake, one mile west of Mine Centre. This property

has been extensively developed and large mining and milling plants erected. There are a number of veins on the property all in an area or boss of protogine, most of which are said to assay well. There are few properties on which such a great variety of separate and distinct deposits can be found. Each vein has a peculiarity of its own—either in the kind of sulphide (copper, iron, zinc or lead) or in the color of the quartz (white, dark, translucent, red or pink).

Canadian Mines Development Company, London, England.

115, 187 } Auriferous quartz. Foley mine, Shoal lake.
Geological Survey.

3, 925 } Auriferous quartz Olive mine, Little Turtle lake. This property has a 25 stamp mill and complete mining machinery. The deposit is a very wide dike of low grade quartzose schist carrying a narrow but rich pay streak.

The Olive Gold Company of Seine River, Limited, Rat Portage, Winnipeg or Mine Centre.

121, 181 } Auriferous quartz. Olive mine, Little Turtle lake.
Geological Survey.

5 Auriferous quartz. Olive mine, Little Turtle lake.
Bureau of Mines.

915 Auriferous quartz. Isabella mine, Mine Centre.
Bureau of Mines.

916 Auriferous quartz showing free gold. Randolph mine, Bad Vermilion lake, Mine Centre. This location, A L 115, adjoins the Golden Star, and one of the veins is supposed to run into the latter property. On the surface of the vein in nearly all the quartz very fine free gold may be seen. The veins are not wide.

Randolph Gold Mining Company of Ontario, Limited, Mine Centre.

917 Auriferous quartz with galena and pyrites. Alice A mine, on Little Turtle river about 20 miles east of Little Turtle lake. There is on this property a large body or dike of quartzose schist carrying pay streaks, of which this sample is representative. A small stamp mill was erected to test the ore.

American & Canadian Gold Mining Company, West Superior, Wisconsin.

Upper Seine River

This is one of the older western gold mining localities and includes the country about the upper portion of the Seine river and in the vicinity of Clearwater, Sawbill, Moose, Steep Rock and Eye lakes and Island falls. Recently several new locations were acquired on the outskirts of the district and placed under active development, for by the construction of the new O. & R. R. railroad prospectors have been enabled to explore lands hitherto practically inaccessible. The old means of entrance was by stage road from Bonheur, on the C. P. R. to Sawbill lake, 31 miles, and thence to all further points by canoe. Heavy shipments such as machinery were brought in during the winter and transported to the mines on the ice.

The ores of this region are entirely free milling, differing from others only in that many of the deposits occur as lenticular masses running in size from

stringers up to bodies over 200 feet wide composed of lenses of quartz closely interbanded with chloritic schist of variegated colors. The rock formations throughout the region are varied, showing numerous distinct types of both Huronian and Laurentian rocks all highly schistose and interbanding, a marked feature being the fluidal structure; and in these are found the above described depositions of quartz The quartz stringers may be auriferous and are often very highly so, but from the large preponderance of the schistose gangue from which the quartz can not be sorted, such veins in many cases have proven to be low grade propositions, a good instance of this being the Hammond Reef ore body. There are of course the usual fissure quartz veins in this region, some of which are the recently discovered leads now under development on Jack lake and Clear lake, while of the older ones the Sawbill, Eye Lake, Harold and several Island Falls deposits are examples.

There are five stamp mills in the region ranging in size from 2 to 40 stamps, the last being at the Hammond Reef mine. The plant on this property is very complete including, besides the reduction plant, mining machinery with cable derrick operating between the quarry and crusher house, aerial tram line, and water power plant two miles distant generating electricity which is transmitted by wire for operating all machinery.

64 Auriferous quartz. **Sawbill mine, Sawbill lake.**
Bureau of Mines.

107 Auriferous quartz **Sawbill mine, Sawbill lake.**
Geological Survey.

110 Auriferous quartz.
178 Auriferous quartz.
Hammond Reef mine, Sawbill lake.
Bureau of Mines.

138 Auriferous quartz. **Gold Winner mine, about 7 miles north of Sawbill or 26 miles south of Bonheur and 1 mile east of the wagon road. The ore body consists of a dyke about 90 feet wide containing an 18 to 20 inch pay streak, from which the samples were taken. They will run in gold nearly $40 00 per ton. There is a 5 stamp mill on the property.**
The Gold Winner Mining Co., Limited, Duluth, Minn.

291 Auriferous quartz. **Pettigrew group, locations B G 89 and 90 on the Seine river. The vein is said to be 60 feet wide and has a shaft 100 feet deep sunk in it with a 70 foot cross cut. The average assay value of the shaft and cross cut is given as $12.85 in gold per ton.**
Collection of F. J. Black, Sudbury.

757 Auriferous quartz **Roy mine, locations A L 298 and 299, Island Falls, Seine river.**
Roy Mining & Development Co. of Toronto.

1248, 1245, 1240, 1242, 1244, 1243 Auriferous quartz. **Lake Harold mine, on lake Harold, 4 miles west of Steep Rock lake. This ore was taken from the lake shore vein and shows free gold. Similar rock milled $60.00 per ton on the plates with concentrates therefrom running $247.00 per ton.**
Collection of F. N. Gibbs, Port Arthur, Ont.

1253, 2035 Auriferous quartz with iron and copper pyrites and galena. **Partridge lake property, Upper Seine river.**
Collection of F. N. Gibbs, Port Arthur, Ont.

1251 Auriferous quartz, iron and copper pyrites and galena. Location G 87, Moose lake, owned by G. H. Feldtmann. This sample assays $40.00 gold per ton.

Collection of F. N. Gibbs, Port Arthur, Ont.

872 Auriferous quartz. From paystreak first level.
877 Auriferous quartz From second level.
878 Auriferous quartz with pyrite.
876 Auriferous quartz in schist showing fine particles of gold in the schist
879 Auriferous quartz with galena and blende, showing fine particles of gold
874 Auriferous quartz and schist.
873 Quartz from fault plane with visible gold on the face.
875 Country rock

Location A L 325, on Jack lake about 12 miles south of Sawbill or 7 miles north of Atikokan River siding O. R. R. Ry. The property is under active development, mining machinery having been installed. The quartz vein as far as explored shows up well both in continuity of size and value. The underground workings have reached a depth of nearly 200 feet.

Jack Lake Gold Mining Co., Limited, Ignace, Ont.

Eagle Lake.

During 1900 prospectors were drawn to this region by reports of discoveries of gold, and prospects were so promising that all through the winter in spite of hardships due to lack of outside communication, a number of men remained at work. The results obtained to date are very satisfactory, as may be seen by glancing at the collection of specimens from this locality.

The formation around the lake consists of a green schistose trap on the north side and red and gray granite and gneiss on the south. The contact is extremely tortuous, its general course being about east and west. Most of the veins prospected are either in or near this contact. One mine, the Eagle Lake, has already been developed to a depth of 60 feet with about 100 feet of underground drifting along the vein.

This summer a steamboat service is to be installed running from Vermilion station, C. P. R., down Vermilion bay to Eagle lake and into all the tributary waters. From Eagle River station a wagon road extends about 5 miles through to the lake, built principally for one mine, the Swanson, but available for other properties at the east end of the lake.

112 } Auriferous quartz Manhattan mine, locations D J 2 and 3. This property
186 } has been partially explored by test pits exposing a quartz vein of good width.
The Manhattan Gold Mining Co., Limited, New York, N.Y.

149 Auriferous quartz Eagle Lake mine. This property is on an island and carries a quartz vein of about 2 feet width. The lead has been worked to a depth of about 60 feet and operations are in progress.

Eagle Lake Gold Mining Co., Limited, Rat Portage.

150 Auriferous quartz. Viking mine, location S 446, on an island at the west end of Eagle lake. Several quartz veins have been discovered on the property all in or near a contact between granite and green trap schist.

E. Stevenson, F. Blackie, L. Stevenson and J. D. Curran, Rat Portage.

148 Auriferous quartz

376 Auriferous quartz showing coarse free gold

Baden-Powell mine, locations F M 167 and 168 or all of South Twin island, Eagle lake. There are two parallel veins on the property, one of which is from 1½ to 10 or more feet wide and is uncovered for several hundred feet; the other, lying 250 feet from the first, is somewhat smaller. Both these quartz veins are remarkable for the coarse free gold that may be seen at points along the surface outcroppings. Of the two samples numbered 376, one is from each of these two veins. The property has been under development for about one year.

J. A. Partington, E Appleton, S. Pinchon and S. S. Forneri, Rat Portage.

990 Auriferous quartz. Grace property, Eagle lake.
J. H Casler, Buffalo, N.Y.

Manitou Lake.

For fifty miles southwest from Wabigoon station along and near the shores of the Wabigoon and Upper and Lower Manitou lakes, the country has been closely prospected and many mining locations have been staked out. Several properties have been opened up on a large scale and treating plants erected, that at the Glass Reef mine within the last year; while at another mine, the Big Master, extensive operations are now progressing towards the installation of complete surface works, including both mining and reduction machinery. A number of other mines are undergoing the different stages of development. The quartz veins carry the values in gold and are free milling, seldom showing more than traces of sulphides.

The region is made accessible by a steamboat service operating between Wabigoon and the foot of the lake of the same name, whence a 7-mile portage leads to Gold Rock P. O. at the head of Upper Manitou lake. From here again other boats ply to all the mines, running down a chain of lakes for a considerable distance below the Manitous. This region is re-awakening into considerable activity, due not only to the extensive operations of the larger mines mentioned above, but to the opening up of a number of new properties and the resumption of work at several older and only partially developed mines.

100 Auriferous quartz with country rock. Big Master mine, Upper Manitou lake, near Gold Rock P. O.
Interstate Consolidated Mineral Co., Buffalo, N.Y.

161, 371, 751 Auriferous quartz. Herrman & Larson mine, 3 miles south of Dryden, lot 6, concession 1, Vanhorne township, Rainy River District. The vein has been explored to a depth of 50 feet. Sample assays in gold $44.00 per ton.
Messrs. Herrman & Larson, Dryden, Ont., and Winnipeg, Man.

348 Auriferous quartz. Location C R 3 and 4, near Lower Manitou lake. Samples assay $14.80 per ton.
The Mines Contract & Investigation Co. of Toronto, Limited.

531 Auriferous quartz. Location H W 104.

532 Auriferous quartz. Location H W 105. Situated on west shore of Roc lake, about 20 miles southeast of Wabigoon with steamboat communicatio n On H W 104 a vein of quartz 5 feet wide extends across the claim, and from

a 10-foot test pit an average sample is said to have assayed $12.50 per ton gold. On H W 105 an 8-foot vein is traceable for 300 feet, said to assay across the surface $10 50 gold per ton.

Jas MacDougall, Wabigoon.

533 Auriferous quartz. Gold Standard mine, on location G 340, Sairey Gamp lake, about 60 miles south of Wabigoon with steamboat communication. A vein of quartz 8 feet wide has been uncovered for 40 feet or more and is now undergoing development. The assays from average samples are given as $7.40 gold per ton.

Gold Standard Mining Co., Morris, Minn.

534 Auriferous quartz. Northern Queen claim, location H W 130, about one mile north of Wabigoon. There is a vein of quartz about 4 feet wide in this property traceable for a considerable distance. Assays are said to give very promising returns.

Jas. McDougall, Wabigoon.

750 Auriferous quartz. Location S V 201, 12 miles southeast of Wabigoon. The vein on the property at a depth of 40 feet is 3½ feet wide and is said to assay $20.48 gold per ton across at this depth.

Alfred Carss, Wabigoon.

New Klondike.

This comprises a small area of country lying south of the Canadian Pacific Railroad between Taché and Brulé stations and is reached by a good road from Dyment station. The country is unusually flat and covered with a dense growth of evergreen trees, so that prospecting is difficult. Nevertheless by the agency of fires and streams portions of the territory have been laid bare, and here the recent discoveries of auriferous quartz veins were made, one of which is now the site of a producing mine. The formation of country rock in the vicinity of the mines is principally felsite, but trap also exists and the contact between this and the granite lies within 3 or 4 miles of the track. The felsite schist is intersected by numerous dykes of quartz porphyry, and it has been found in the case of the developed mines that the quartz veins occur in this felsite and side by side with the porphyry.

The most important property in the region is the Sakoose. While still in the prospect stage it proved so promising that when brought to their notice in 1900, the present owners bought it outright and at once commenced preparations for active development and shipping. A 7-mile spur line of the Canadian Pacific Railway was constructed from Dyment to the mine and over this a complete equipment of mining machinery was brought in and is now in operation. The ore, hoisted in the skip from underground, dumps automatically into bins above the railroad track and is loaded into the cars and hauled about 130 miles to Keewatin to be treated in stamp mill reduction works situated in that town and owned by the same mining company.

There are several other ledges on adjoining properties being worked on a smaller scale and from their similarity to the Sakoose deposit it is expected they will also prove valuable. The geologic conditions of the veins in the immediate locality are strikingly alike and the ore forms a distinct class for western Ontario. The quartz is dark, vitreous and translucent, and in the Sakoose vein is heavily mineralized along the pay chute with sulphides of copper, zinc, iron and lead.

101 Auriferous quartz with iron and copper pyrites, zinc blende, galena and country rock. Sakoose mine, locations H W 416,468, 475 and N T 22, 200 acres. Work is being carried on entirely from a main shaft on location H W 416, which has reached a depth of about 200 feet with extensive lateral drifts, cross cuts and stopes. The vein occurs in an area of quartz porphyry and blocky schists, and is composed of a dark quartz carrying zinc-blende, iron and copper pyrites and galena, the latter mineral always accompanying the highest grade ore. The ore is shipped by a spur line to Dyment and thence on the main C. P. R. line to Keewatin, a distance of about 130 miles, where it is treated by a 20-stamp mill in the Keewatin Reduction Works owned by the same company. The mine has been shipping for about one year.

Ottawa Gold Milling and Mining Company, Limited, Ottawa, Ontario.

356 Auriferous quartz Crichton-Petrie mine, location H W 464, one mile from the Sakoose mine or about 6 miles south of Dyment. The samples are from a test pit 7 feet deep on a 4 foot vein which contains an 18-inch pay streak. The rusty rock is from this pay streak and assays from $30.20 to $300.75 in gold per ton.

Messrs. Crichton and Petrie, Dyment, Ontario.

375, 732 Auriferous quartz Twentieth Century mine, location H 398, situated on Upper Manitou lake, 28 miles south of Dinorwic. The vein is a true fissure, about 8 feet wide, and the ore is said to average $9.00 gold per ton. A complete steam hoisting and air compressing and drilling plant is in operation.

The Twentieth Century Trading Company, Boston, Massachusetts.

396 Auriferous quartz Locations H W 551,637, 640 and 668, on lake Minnietakie, reached by wagon road running northeast from Dinorwic. There are several veins on these claims represented by the samples. On H W 668 an open cut 80 feet long and 15 feet deep explores a contact vein 4 feet wide between granite and trap. On H W 551 the lead is said to be 160 feet wide and traceable for a mile, to give pannings of gold for the full width, and to assay from $3 00 to $30.00 per ton in the test pits. H W 637 and 640 contain apparently a large number of intersecting quartz veins.

A. O. Vaughan, Dinorwic, Ontario.

Sturgeon Lake.

This is one of the new districts which through vigorous prospecting during 1900 has become already well known throughout Ontario Many of the veins discovered are very wide deposits of quartz, and some of them show a large amount of visible gold at numerous points over the surfaces; but except for traces of sulphides of iron, lead and copper, the vein matter so far exposed is a clear white quartz, in some veins interbanded with chloritic schists. As in the Eagle Lake region, a contact between granite and trap runs through the country and most of the locations are staked out along this. For instance, in the case of the Sturgeon Lake Mining Co, 4¼ miles of mining claims have been taken up along the line of the main Sturgeon lake contact. The veins on this property are so promising, containing as they apparently do a large amount of visible gold, and traceable for long distances, that the company determined without further delay to bring in a 10-stamp mill and other necessary mining and reduction machinery. This is now set up and will be in operation shortly. Other capitalists have bought out various properties on the shores of Sturgeon lake, and in each case reports are favorable. This summer will afford further chance to test

the deposits both on and below the surface, and if development equals expectations, this will be one of Ontario's most active regions. The exhibits from here are fairly large in spite of the difficulty in transporting to the railroad.

Sturgeon lake lies about 45 miles northeast of Ignace on the C.P.R., and in summer is reached from this station by means of canoes, advantage being taken of a chain of rivers and small lakes broken by occasional short portages; over these latter a road was cut last fall, thus affording a good winter trail to all the prospects. The road will also be available during summer, but must then be used in conjunction with canoes and boats.

193, 544 Auriferous quartz showing coarse free gold. Sturgeon Lake mine. On this recently discovered property a 10-stamp mill is being installed this spring. The ledges, of which there are several, appear very continuous on the surface and show remarkable specimens of free gold.
Sturgeon Lake Gold Mining Co., Limited, St. Catharines, Ont.

Lake Superior.

This covers an extensive stretch of country, the gold mines occurring throughout it in more or less isolated localities and separated widely from each other. The most easterly mine probably is the Shebandowan lake property on the line of the O.R.R. Ry., and the most westerly the Empress, north of Jack Fish bay. There are many other properties situated along the north shore of Lake Superior near the C.P.R. tracks, but beyond the Empress mine none have as yet attained prominence.

40 Auriferous quartz. Empress mine, Jackfish bay, lake Superior.
Bureau of Mines.

350 Auriferous pyrite. Location AL 215, near Schreiber, C.P.R., north shore of Lake Superior. The deposit consists largely of sulphides of iron with possibly some copper. The samples assay 6 oz. 4 dwt. in gold per ton.
The Mines Contract and Investigation Co. of Toronto, Limited.

773 Auriferous quartz. Group of locations HB 467, R 692 and 693, situated near Jackfish, Lake Superior.
John McCuaig, Jackfish, Ont.

162 Pyrrhotite. Handy Transport property, 2 miles west of Rossport and alongside the C. P. Railway tracks. There is a fairly large deposit of pyrrhotite and pyrite here, which is said to assay well in gold with a little silver.
John Bowman, Rossport, Ont.

1200 Sylvanite, chalcopyrite, pyrite and galena in vein matrix.
1223 Talcose schist. Country rock of Huronian mine vein.
Huronian mine, Moss township, Thunder Bay district.
Collection of F. N. Gibbs, Port Arthur, Ont.

1222, 1208, 1205, 1224, 1213, 1201 Auriferous quartz carrying telluride and free visible gold. Huronian mine, Moss township, Thunder Bay District. These specimens illustrate the character of the ore of this vein.
Collection of F. N. Gibbs, Port Arthur, Ont.

Michipicoton Mining Division.

The first occasion on which gold was discovered in this region was in 1897, and such was the interest aroused that a big rush of prospectors followed for the next two years, since which time the industry has reached a more steady basis, and of the large number of promiscuously staked out locations several good ones are now undergoing proper development work. Complete outfits of mining machinery have been installed at four of the most important properties and are now in full operation. The Minto mine is working down to the 130 foot level; the Zagloba to the 150 foot; and the veins exposed in these and other auriferous quartz deposits contain good values. There is as yet but one stamp mill in the region, and this is only a small testing plant not in steady operation. Access is had to the town of Michipicoton in summer by means of steamers which ply between there and Sault Ste. Marie; in winter by a stage line which runs regularly between the town and Grassett Station on the C.P.R., about 50 miles distant. The Algoma Central Railway is now under construction from Sault Ste. Marie, with a branch to Michipicoton Harbor.

58 Auriferous quartz. **Jubilee claim.**
Bureau of Mines.

354 Auriferous quartz **Minto mine. The samples consist of ore from the surface, from the 70 foot level and the 130 foot level.**
The Wawa Gold Mining Co. of Michipicoton, Limited, Toronto.

Eastern Ontario.

The most important localities for gold mining in this part of the Province are the counties of Hastings and Frontenac. Here in the last few years the industry has grown to one of very considerable importance. During the past year stamp mills were running at five properties, the Deloro, Belmont, Atlas, Arsenic Co'y.'s, Boerth and Sophia, but only for limited periods at the last two. Three of these mills contain batteries of 10 stamps, one, the Deloro, of 20 stamps, and one, the Belmont, of 30 stamps.

The Deloro deposits differ from those of other gold mines in Ontario in that most of the gold is closely associated with arsenical sulphides, the ore requiring treatment quite different from the ordinary methods. In 1900 such additions and changes were made to the whole plant that now it has double its former capacity. Another ten stamps were installed making a total of 20; the number of cyanide tanks was doubled, and other supplementary and newer machinery erected to correspond. The ore from the batteries runs over amalgamation tables and thence to the concentrators, the product from here going to the cyanide tanks where it is treated with a bromo-cyanide solution and a high extraction of gold obtained thereby. The tailings, composed principally of arsenical pyrites, are removed, dried and conveyed into furnaces for the extraction of the arsenic as a pure by-product. The mines have become steady producers, and on a fairly large scale, since the capacity of the mill now amounts to 60 tons per day.

The Belmont gold mine, situated not far from the Deloro and Atlas Arsenic Co. mines, has the largest plant in eastern Ontario, and is one of the largest producers of bullion. During the last two years by systematic operations the mine has been developed into such a state as to warrant the enlarging of all the mining plant and reduction works to handle the ore in sight, which will form a continuous supply for the 30 stamps for some time to come.

The Boerth mine is situated in Frontenac county about 12 miles west of Clarendon Station on the Kingston & Pembroke Ry. The Hastings county gold mines mentioned all lie within a few miles of Marmora Station. Another promising property is the Golden Fleece, situated in Kaladar township, county of Lennox and Addington near Kaladar Station, C.P.R. The quartz vein has undergone some surface development and a mill test of ore has been made. This, together with the surface assays across its width of about 50 feet, show it to be a low grade deposit and free milling. It has been traced for three miles so that there is room for a large reduction plant to treat the ore on an adequate scale. The Ophir mine lies within a few miles of the town of Bruce Mines, near Sault Ste. Marie.

2 Arsenical pyrites Dan O'Connor's properties, Net lake, near Lake Temagami. This deposit is said to assay high in arsenic, with good values in gold. The ore is found in translucent quartz which occurs in numerous veins and lenses in areas characterized by the presence of Huronian rocks and their associate eruptions.
Bureau of Mines.

39 Auriferous mispickel Consolidated mine, Marmora, Ont.
Bureau of Mines.

41 Auriferous quartz Ledyard mine, Belmont township, E. ½ lot 19, concession 1, Peterborough county.
The Ledyard Gold Mines Co., Limited, Toronto.

43 Auriferous pyrite and quartz Eastern Ontario.
Wm. Armstrong, Glanmire P.O., Ont.

78 Quartz with visible gold. Scadding township, Nipissing District.
Bureau of Mines.

96 Auriferous mispickel Marmora township, Hastings county. This is some of the first ore found in the district, probably at the Richardson mine.
J. F. Whitson, Toronto.

111 Auriferous mispickel. Eastern Ontario.
J. James.

146 Auriferous quartz. Sheard mine, Parry Sound. The sample was taken from a shaft 10 feet deep and assays $9.64 per ton.
Hattie Belle Gold, Copper & Nickel Co. of Parry Sound, Limited, Sunderland, Ont.

163 Auriferous quartz. From group of locations W D 79, 116, 117, 118, 80, 120 and 119 in the township of McArthur, Nipissing District.
Geo. McEwan, Markstay, Ont.

168 Auriferous quartz. Boerth mine, Clarendon township, Frontenac county, near Ardoch. The mine is being worked at a depth of 240 feet and the ore extracted carries from $4.00 to $30 00 per ton in gold. A 10-stamp mill has been erected.
The Clarendon Gold Mining Company of Ontario, Limited, Detroit, Mich.

13 Auriferous quartz. Boerth mine, Clarendon township, Frontenac county.
Bureau of Mines.

169 } Auriferous quartz with silver and iron and copper pyrites. Little
800 } Dorris mine, Clarendon township, Frontenac county. This vein is about 6 feet wide, well defined between walls of diorite and crystalline limestone and traceable for 1½ miles.
T. J. Watters, Ottawa.

253 Auriferous quartz. From Scadding and Rathbun townships, Nipissing District. Frank Cochrane, Sudbury, owner.
School of Practical Science Museum.

263 Auriferous quartz. Location W D 79; owner, O. Vrooman, Sudbury.
Collection of F. J. Black, Sudbury.

266 Auriferous pyrite. Evans mine, Sudbury district. Assays run from $4.00 to $22.00 to the ton. Owner A. Evans, Sudbury.
Collection of F. J. Black, Sudbury.

278 Auriferous quartz. Wahnapitae mine. The vein is 15 inches wide on surface. Assays are said to run from $30.00 to $200.00 per ton. Owner, F. J. Black.
Collection of F. J. Black, Sudbury.

282 Auriferous chalcopyrite and quartz. From Taylor mine, near Desert lake, Addington county. Owner, H. O. Taylor, Desert Lake P. O.
Collection of F. J. Black, Sudbury.

300 Auriferous quartz. Fairbank township, Algoma District. Owner, F. J. Black.
Collection of F. J. Black, Sudbury.

304 Auriferous quartz. Monarch mine, in unsurveyed territory 50 miles north of Sudbury. The vein is said to be 150 feet wide and traceable for 3 miles. Assays from surface samples give from $2.00 to $5.00 per ton in gold. Owner, F. J. Black.
Collection of F. J. Black, Sudbury.

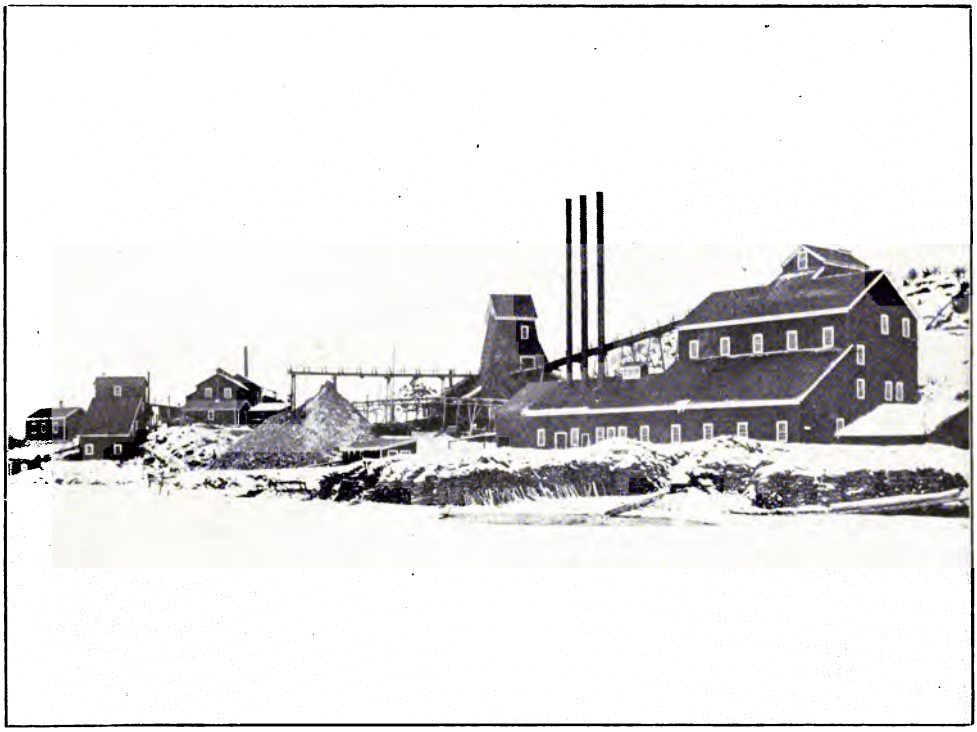
315 Auriferous quartz showing free gold. Davis township, Nipissing District. Owner, F. J. Black.
Collection of F. J. Black, Sudbury.

319 Auriferous quartz. Houston mine; owner, F. J. Black.
Collection of F. J. Black, Sudbury.

326 Auriferous quartz showing free gold.
326a Chalcopyrite
Rathbun township, lot 13, concession V, Nipissing District. There are three veins on the property carrying gold, copper and arsenic and all show free gold. The veins are 10 feet, 4 feet and 22 inches wide, respectively. Two shafts have been sunk.
Wm. McVittie, Toronto.

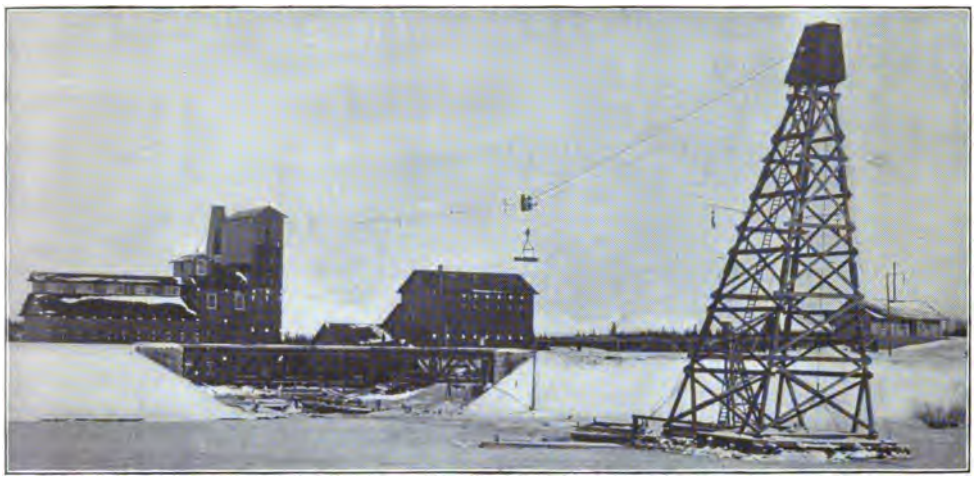
493 Auriferous quartz and pyrite.

770 Auriferous quartz. From west stope 185 foot level, No. 2 shaft.
771 do do From 300 foot level in No. 3 shaft.
768 do do From 100 foot level in No. 5 shaft.
764 do do From No. 7 shaft.
767 do do From No. 8 shaft.
766 do do From the dump of No. 10 shaft.
769 do do From near the surface in No. 11 shaft.
765 do do From stope on 300 foot level.
Belmont mine; consisting of the southeast quarter of lot 21 and east half of lot 20, concession 1, Belmont township, Peterborough county. The vein is a large body of fairly low grade quartz carrying a small proportion of sulphides. It is being operated on a suitable scale by a 30-stamp mill plant and extensive underground workings
Cordova Exploration Co., Limited, Cordova, Ont., and Newcastle-upon-Tyne, Eng.



SULTANA GOLD MINE, LAKE OF THE WOODS.

REGINA GOLD MINE, WHITEFISH BAY, LAKE OF THE WOODS.



KEEWATIN REDUCTION WORKS. SHOWING TRAMWAY FOR CARRYING ORE FROM BARGES TO WORKS; LAKE OF THE WOODS IN THE FOREGROUND; RAILWAY TRACK BETWEEN IT AND WORKS.

[6] RAT PORTAGE REDUCTION WORKS.

552 Quartz showing free gold. Vermilion mine, Denison township, Algoma District.
Bureau of Mines.

553 Quartzose material containing free gold. McGown mine, Parry Sound.
Bureau of Mines.

554 Quartz showing free gold. Crystal mine, Rathbun township, Nipissing District.
Bureau of Mines.

712 Auriferous mispickel Cook prospect, situated 5 miles southeast of Plevna P. O., and 2 miles southwest of the Boerth gold mine, in Clarendon township, Frontenac county. A shaft has been sunk in the deposit 40 feet and the vein stripped on the surface. The arsenical pyrites occurs as a vein in a schistose diorite rock Assays of the vein matter range from about $4.00 to $18.00 gold per ton and an average sample across the deposit gave $9.00 gold per ton. An assay of clean mispickel gave 42.34 per cent. arsenic.
J. W. Cook, Marmora Ont.

91 Auriferous quartz with galena and chalcopyrite. Location W R 90 on Sturgeon river, Nipissing District.
Wm. O'Connor, Sudbury.

172 Auriferous quartz with iron and copper pyrites. Chisholm mine, Frontenac county. The ore carries values in gold, silver and copper.
J. H. Chisholm, Cloyne P. O., Ont.

11 Auriferous quartz, blende and copper pyrites Parry Sound District.
Bureau of Mines.

929 Auriferous quartz and mispickel. Representing the various different ore bodies.

929a Country-rock of vein. Illustrating the geological formation on the property. Delora mine, Delora, Marmora township, Hastings county. This property, which comprises 525 acres, is situated one mile from the station of the Central Ontario Railway at Marmora. The deposit which is worked is not a defined vein, but a shattered zone of country-rock in the fissures and spaces of which have been deposited quartz, calcite, mispickel and copper and iron pyrites. The general band of ore bearing shattered rock can be followed a long way. It averages in width, perhaps, 5 feet, running from one foot up to 25 feet. Part of the gold occurs free, generally thus in the quartz, but highest values are found in a mixture of fine-grained arsenical pyrites with quartz. Twelve fairly representative samples of the ore bodies gave an average of $39 47 per ton

Underground development consists of two working shafts and one air shaft, with about 1,300 feet of drifting and cross cutting.
Canadian Goldfields Limited, Deloro, Ont.

929b Barley pulp Crushed ore.

929c Arsenical, iron and copper pyrites. Concentrates from battery pulp.

929d Tailings Barren sand after concentration.

929e Gold brick (model) Produced from amalgam from the battery plates.

929f Crude gold bullion. From bromo-cyanide treatment of concentrates.

929g Refined gold bullion. Produced by re-smelting the crude bullion (No. 929f.) Deloro mine, Marmora township, Hastings county. The products of the stamp mill, which is now a very complete and efficient plant, including tanks where the concentrates are treated by the bromo-cyanide process.
Canadian Goldfields Limited, Deloro, Ont.

829 **Auriferous quartz** Lot 19, concession XIX, Grimsthorpe township, Hastings county. The vein of quartz is 24 feet wide and traceable for one-half mile. It has been prospected along the surface and the following assays made from samples from the the test pits :—Gold, $3 80 and $3.90 per ton.
F. Landenberger, Belleville, Ont.

SILVER.

The silver producing district of our Province is confined almost exclusively to rocks of the Animikie series in the Cambrian system in the Thunder Bay region, lying to the north and west of Thunder Bay in Lake Superior. The veins which carry silver are found cutting ranges of table-topped hills or mountains whose summit is basaltic trap and whose base is black slate. Underlying the slate are beds of chert and jasper of extreme hardness, which contain a percentage of iron, and it is found that the mineral veins in these beds are leaner in silver than in the slates. This fact has depreciated to some extent the value of silver mines in the district, but recent accounts give rise to the hope that beneath the cherts the veins become enriched. However, as yet there has been no satisfactory test made of this—nothing beyond a few insufficient diamond drill holes. Silver Islet mine, which lies in Lake Superior south of the Thunder Cape promontory, was one of the earliest discoveries in the region, and from its opening in 1870 to the suspension of work in 1884, the value of its silver output was $3,250,000. The total depth reached underground was 1,230 feet. Although the vein of this mine has been explored through the slates on the mainland for about a mile, no silver ore was there found, the only productive part being at the intersection of the slates and the trap dyke which constitutes the island. It is out of this dyke that the silver is supposed to have been dissolved and then redeposited in the vein.

Other mines in this district, the best known of which are the Beaver, Badger, East and West Silver Mountain, have yielded large quantities of ore, but at present the only one in operation is the West Silver Mountain. This has been working steadily for several years and is now in good producing shape. The ore is sorted into two grades, one for shipping, in which either the native or the sulphide of silver is visible, the other a milling ore, a lower grade product which is treated in a concentrating plant at the mine. The vein filling is more or less typical of all the silver veins, consisting chiefly of coarsely crystalline calcite with green fluorite, yellowish barite and a little amethystine quartz, together with native silver, argentite, zincblende, galena and a little pyrite. The argentite occurs in places in an interesting manner, having been deposited in the partings or jointage of the slates in thin sheets or leaves; the native silver in some cases is similarly found, but for the most part this occurs in needles and webs.

Probably the main cause of the closing down of most of the mines several years ago was the drop in the price of silver. Since then some have resumed operations for short periods. With such an example as the West End property, together with the lack of any serious adverse reasons, it is surprising, that development of some of the really fine showings is not being proceeded with.

The collection of the silver ore specimens is most complete, including samples from every mine or property of any account ever operated in Ontario. The West End Silver mine has made a specially fine exhibit.

85 **Argentiferous zincblende.** North shore of Lake Superior.
Bureau of Mines.

125 Amethyst crystals with pyrite. Silver Mountain west of Port Arthur.
Wm. Margach, Rat Portage.

126 Argentite in calcite Cores from diamond drill borings in East and West End Silver Mountain mines.
Wm. Margach, Rat Portage.

128 Argentite in calcite. Badger mine.
Wm. Margach, Rat Portage.

189 Argentite in calcite
133 Argentite.
130 Argentite in calcite.
West End Silver Mountain mine.
Wm. Margach, Rat Portage.

38 Argentiferous calcite with blende and fluorite.
124 Crystallized quartz
127, 190 Argentite.
129 Argentite in calcite.
131 Argentiferous zincblende and calcite.
134 Argentite in slate breccia with quartz, calcite, zincblende and pyrite
Beaver mine, west of Port Arthur.
Wm. Margach, Rat Portage.

135 Argentite in calcite. Shuniah mine, west of Port Arthur.
Wm. Margach, Rat Portage.

132 Argent te in calcite. East End Silver Mountain mine, west of Port Arthur.
Wm. Margach, Rat Portage.

37 Argentiferous quartz with amethyst, fluorspar and country rock.
East End Silver Mountain mine, west of Port Arthur.
Bureau of Mines.

159a Silver. Twin City mine, Lake Superior.
Bureau of Mines.

198 Native silver.
213 Argentite in quartz
214 Huntilite (silver arsenide).
215 Animikite (silver antimonide).
235a Silver.
Silver Islet mine, off Thunder Cape, Lake Superior.
Bureau of Mines.

209 Native silver. Silver Islet mine, off Thunder Cape, Lake Superior.
J. F. Whitson, Toronto.

212 Argentite.
199, 200 Native silver.
Near Port Arthur, Lake Superior.
Bureau of Mines.

201 Argentite in calcite.
211 Argentite with breccia.
227 Zincblende in vein matter.
228 Argentite and galena in vein matter.
Silver Mountain mines, west of Port Arthur.
Bureau of Mines.

202 Native silver in argentite
223 Argentiferous vein matter containing amethyst and slate.
225 Argentite in slate and calcite.
232 Quartz and vein rock.
234 Silver.
238 Crystallized calcite

Beaver mine, west of Port Arthur.
Bureau of Mines.

207 Native silver. Beaver mine, west of Port Arthur.
J. F. Whitson, Toronto.

203 Argentite in quartz.

205, 235, 236 Native silver, argentite and zincblende in calcite.

210, 229 Argentite in calcite.

224 Argentite, zincblende and pyrite in calcite and quartz.
226 Argentite, zincblende and galena in calcite.
230 Native silver in quartz and calcite
231 Native silver in vein matter.
233 Argentite and zincblende in calcite
237 Argentite and zincblende in quartz.

Badger mine, west of Port Arthur.
Bureau of Mines.

206 Native silver and argentite in contact with slate breccia. Badger mine, west of Port Arthur.
J. F. Whitson, Toronto.

208 Native silver. Rabbit Mountain mine, west of Port Arthur.
J. F. Whitson, Toronto.

239 Native silver. Rabbit Mountain mine, west of Port Arthur.
Bureau of Mines.

204 Argentite in calcite. Float from Thessalon river, Lake Huron.
Bureau of Mines.

888 Native silver and argentite in vein matter. West End Silver Mountain mine, west of Port Arthur. These seven large samples were taken from the mine specially for this exhibit, and are among the richest large pieces of silver ore ever shown. It is estimated that they will carry 5,000 ounces silver to the ton, or in other words that the samples contain 40 pounds of silver. The silver is in both the native and sulphide states.

This mine is at present the only one operating in this district. There are complete mining and concentrating plants on the property. The high grade ore, such as is shown, is sent direct to be smelted, while the average grade is concentrated before being shipped. The mine has been producing bullion for several years.

Wiley & Co., Port Arthur.

497 Argentiferous blende and galena. Calumet island, Ottawa river, Province of Quebec.

J. C. Russell, Ottawa, Ont.

F. N. GIBBS' COLLECTION.

The following samples of silver ore are from the collection of Mr. F. N Gibbs, Port Arthur, Ont.

1026 Argentiferous galena.
1000 Native silver and argentite in pink dolomite.
1022 Pink dolomite Diamond drill core.
1027 Animikite (silver antimonide) crystal Found at this mine only.
Silver Islet mine, off Thunder Cape, Lake Superior.

1003, 1005, 1024, 1006, 1001, 1010, 1008, 1012, 1004, 1014, 1009, 1011, 1007, 1018 } Native silver, argentite and galena in dolomite. Silver Islet mine, off Thunder Cape, Lake Superior. These specimens of the celebrated pink colored ore of this mine showing native silver and sulphide, argentite, with occasionally some galena, illustrated the character of the mine's product in past years.

1047 Argentite in calcite and slate Taken from the surface of the vein where discovery was made.

1068, 1069 } Slate These slates are of the Animikie period, and constitute the country rock of the vein.

1063 Argentite and argentiferous zincblende From the surface.
1050 Native silver and argentite in calcite.
1040 Argentite in quartz and calcite
1054 Native silver and argentite in zincblende
Rabbit Mountain mine, west of Port Arthur.

1057, 1056, 1045, 1049, 1051, 1052, 1053, 1042, 1041, 1043, 1055, 1048, 1070, 1059 } Argentite Rabbit Mountain mine, west of Port Arthur. These specimens show a small quantity of the accompanying vein matrix of the ore body, and exhibit the high grade character of this deposit.

1082 Argentite and argentiferous zincblende with calcite. From Bonanza strike.
1080 Argentiferous zincblende. From Bonanza strike.
1072 Leaf argentite on slate

1076, 1078, 1073 } Native silver and argentiferous zincblende in quartz, calcite and fluorspar.

1079 Crystalized argentite in calcite
1075 Argentite and argentiferous zincblende in calcite.
1077 Native silver and argentite in quartz, calcite and fluorspar.
Beaver mine, west of Port Arthur.

2031 Argentite in calcite, fluorspar and amethystine quartz.
2016 Argentite in quartz and calcite
2015, 2018, 2013, 2008 Argentite in quartz, calcite and slate.
2012, 1087 Argentite and argentiferous zincblende in quartz, slate and calcite.
2019 Argentite and argentiferous zincblende in amethystine quartz and calcite.
Porcupine mine, west of Port Arthur, Lake Superior.

1096, 1097, 1098, 1099, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2009, 2010, 2014 Argentite and native silver in slate, quartz, calcite and fluorspar.
Porcupine mine, west of Port Arthur, Lake Superior. Characteristic specimens well representing the product of the mine.

2039 Native silver, argentite and argentiferous zincblende.
East End Silver Mountain mine, west of Port Arthur.

1085 Argentite and argentiferous zincblende in quartz, calcite and slate.
Silver Creek mine, west of Port Arthur.

1084 Argentiferous tetrahedrite (grey copper) in calcite.
Spar Island mine, Spar Island, Lake Superior, southwest of Port Arthur.

1086 Argentiferous brown ore.
Little Pic Silver mine, near Middleton, C.P.R., east of Port Arthur.

1021 Diamond drill core.
Pie Island mine, Thunder Bay, Lake Superior. Showing silver bearing strata of this mine.

94b Native silver.
Rabbit Mountain mine, west of Port Arthur, Lake Superior.
Bureau of Mines.

COPPER.

Copper is obtained in Ontario in several forms, either as the native metal or as chalcopyrite, bornite or other sulphides. Copper mining is one of the oldest branches of the mineral industry in Ontario, beginning with the operations at Bruce mines in 1846. Since then other copper-bearing regions have come into notice, namely, those of Thunder Bay, the east shore of Lake Superior, the north shore of Lake Huron, Sudbury and Parry Sound.

Thunder Bay.

At present there are two points where copper mining in this part of the Province is being developed, one at Black Bay, on the north shore of Lake Superior, and the other inland near Shebandowan lake on the O.R.R. Ry. For 8 or 10 miles along the northwest shore of the peninsula which forms the eastern boundary of Black Bay, lands have been recently located for copper, the metal having been found at points all along this stretch. The copper occurs in the native state in amygdaloidal trap rock of various colors lying in the cavities filled with calcite or gypsum. At some points a very coarse conglomerate outcrops apparently below the solid trap, composed principally of large rounded boulders of the same amygdaloidal trap cemented together by a light green eruptive. One of the properties has been under development for about a year and from the results of the mining the collection of specimens was obtained.

At Round lake, near lake Shebandowan, is situated the Tiptop copper mine, also well represented in the exhibit. The vein is composed of quartz carrying copper pyrites, and on the lode considerable development by shafts and stripping was done during the past year with promising results.

There are other localities west of Port Arthur in which copper pyrites deposits have been found, either as veins containing that mineral primarily, or along with gold ores, but so far the Tiptop mine is the only one in which extensive development for copper has taken place.

28 Quartz with chalcopyrite, malachite, azurite and galena. Lake Superior.
Bureau of Mines.

97 Native copper. From an island in Nipigon bay, Lake Superior.
J. F. Whitson, Toronto.

98 Native copper. North shore of Lake Superior.
J. F. Whitson, Toronto.

153 Native copper Black Bay, Lake Superior.
Bureau of Mines.

158, 159, 378 Native copper in amygdaloidal trap.

158a Native copper. Trombly and Grahame properties, on the southeast shore of Black Bay, Lake Superior. (See introductory description of Thunder Bay Region.)
P. Trombly and W. Pritchard, Port Arthur.

216 Chalcopyrite. Thunder Bay, Lake Superior.
Bureau of Mines.

762 Chalcopyrite in quartz. Tiptop Copper mine, locations K 64 and 65, situated at Round lake, Moss township, Thunder Bay District, and 8½ miles southwest of No. 9 siding O. & R R. Ry. The property was taken up some 32 years ago but remained undeveloped until 1899. Since then underground work has been done showing up a promising vein of quartz containing copper pyrites.
Folger Bros. & J. Hammond Estate, Fort William, Ont.

2032 Copper and iron pyrites. Tiptop mine, Round lake, Moss township, Thunder Bay district.
Collection of F. N. Gibbs, Port Arthur.

Michipicoton.

51, 88 } Native copper. Michipicoton island, Lake Superior. Bureau of Mines.

82, 218, 219, 220 } Native copper. Point Mamainse, Lake Superior. Bureau of Mines.

191 Native copper. Point Mamainse, Lake Superior. Large pieces of copper taken from here during the recent period of operations. Nipigon Mining Lands Co., Henry T. Sibley, Detroit, Agent.

967 Chalcopyrite. Michipicoton district. The Algoma Commercial Co., Limited, Sault Ste. Marie, Ont.

North Shore of Lake Huron.

The country along the north shore of Lake Huron is at present traversed by only one line of railroad, the Sault Branch of the C. P. R. The first copper mining in Ontario was in this locality, at the Bruce, Wellington and Huron Copper Bay mines. For many years after the opening up, the difficulties of transportation for the necessary machinery were so great and so many mistakes were made in procuring suitable reduction plants that only the extraordinary richness of the veins enabled the industry to succeed. The mines, however, continued in operation for 30 years, from 1846 to 1875 the actual workings extending for a distance of over two miles east and west The ore occurs principally as chalcopyrite in veins of white quartz cutting across the formation of dark greyish-green diabase. On the Bruce location several nearly parallel veins running about east and west were worked, the thicker ones being about four feet wide.. On the other two locations there are two master veins called the Main lode, varying from 3 to 15 feet in width, and the Fire-lode, a branch of the latter, of about the same thickness. The Bruce mine veins were worked to a depth of 180 feet, but on the other locations a depth of about 300 feet was attained. The vein matter as mined contained an average of 5 per cent. copper, but was concentrated by crushing and jigging to about 20 per cent. before shipping to England, which was then the chief market. At different times smelting, lixiviation and cementation were tried upon the grounds, but only to be abandoned. It has been ascertained that copper ore, precipitates, ingots and slags amounting to 40,515 tons and realizing about $3,300,000 were shipped from these mines in the thirty years during which they were first worked.

About four years ago this locality again began to attract the attention of prospectors and capitalists, the chief results being the discovery of a vein at Rock lake which has since shown up as a remarkably fine prospect, and the purchase of the Bruce mines by a new company who have this spring completed the erection of large concentrating works on the ground. This plant is a complete one comprising rock breakers, rolls, jigs, hydraulic sizers, round tables, Griffin mills, Cornish rolls and Frue vanners. There is already ore enough blocked out underground outside of the old workings to supply the mill for several years to come at its present capacity of between 400 and 500 tons a day. A very complete collection of specimens has been contributed to the exhibit by the Bruce Mines Company with descriptions and values by assay.

The Rock Lake property lies on Rock lake 9 miles north of Bruce Mines village. Considerable work has been done on the vein with the result that it has been found to extend for a distance of 3 miles across the Company's property, varying in width from 17 to 46 feet between walls of slate. It is composed of quartz carrying chalcopyrite and bornite in varying quantities, all the ore so far extracted giving good percentages of copper and values in gold and silver. All the necessary mining machinery is installed and in operation. A railroad has been built along the side of the vein for nearly its whole length terminating at the site for the concentrating and smelting plants. The foundations for these latter buildings were finished this spring, and the erection of the machinery is now under way.

Another very promising property is the Massey mine, three miles from the village of Massey on the Sault branch of the C. P. R., and at the eastern boundary of Algoma district. It is in the prospect stage as yet, but by recent surface work the vein has been traced for a distance of one mile and a continuous ore body revealed in what is apparently a shear zone in the green schists following along the strike of the latter, approximately parallel to and a few hundred feet from a contact between the schists and granite. The lode was originally pure copper pyrites, but by subsequent movements other fissures were formed through or contiguous to it, and in these quartz has been deposited, now amounting to a large percentage of the whole vein matter. The ore as mined is said to vary from 3½ to 6 per cent. copper with small values in gold. The Company have secured water powers close at hand of 2,000 horse power capacity to furnish power for mining and concentrating purposes. Sorted ore and concentrates from the mill will be treated at the new Orford smelter at Copper Cliff.

92 Chalcopyrite. Locations P 87 and 88, on Blind river, in Township No. 163, Algoma District.
Aubrey White, Toronto.

104 Chalcopyrite. Superior Copper Company's mine.
T. R. Harvey, Goulais Bay, Algoma, Ont.

116, 195 Chalcopyrite Rock Lake mine, 12 miles north of Bruce Mines, Algoma District.
Geological Survey.

283, 294, 299, 325 Chalcopyrite in quartz. From Massey station in May township, Algoma District.
Collection of J. F. Black, Sudbury.

308 Chalcopyrite in quartz. From F. Cochrane's property near Massey.
Collection of J. F. Black, Sudbury.

311 Chalcopyrite in quartz. Snider township, Algoma District.
Collection of J. F. Black, Sudbury.

312 Azurite in quartz. Surprise property.
Collection of J. F. Black, Sudbury.

387, 759 Chalcopyrite. Paton claim on Whiskey lake, Township No. 137, Algoma District.
James Paton, Massey Station, Algoma.

19 Chalcopyrite and bornite. Paton claim, Township No. 137, Algoma District.
Bureau of Mines.

546 Chalcopyrite. Berth 163, North Shore of Lake Huron.
J. B. White, Manitowaning, Ont.

593 Chalcopyrite and bornite. Mass 3 ft. 4 inches x 2 ft. x 2 ft.
595 Copper ingots

The ore comes from the Stobie Copper mine, Johnson township, Algoma District, about 1 mile north of Stobie station. A vein 3 to 5 feet wide composed of chalcocite, chalcopyrite and bornite outcrops for several hundred feet in length. A fair amount of development has been done and from the dump samples were taken which assayed:

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Gold....	$1.00	trace	nil	nil	trace per ton.
Silver...	.75	$3 30	$1 65	$2 40	" per ton.
Copper..	12.91	61.27	29.16	23.98	4.58 per cent.

The ingots were obtained from smelting some of the ore.

The Stobie Mining Co., Limited, Sault Ste. Marie, Ont.

720 Copper pyrites. Egan's house lot 50, from 7 feet depth.
721 do do Three-quarter mile north of iron mines.
722 do do Egan's house lot 50, from 4 feet depth.
723 do do Egan's house lot 50, from 9 feet depth.
724 do do N. E. corner lot 51, from 10 feet depth.
726 do do Lake shore lot 50, from near the surface.
725 do do Egan's house lot 50, from near the surface.

The specimens are from an area of land comprising 6,400 acres situated near Desbarats, Algoma, on the C. P. R., Sault Branch, which traverses the ground, the railroad cuttings opening up many good showings, from which several of these samples are taken.

Gillespie & Co., Montreal, Agents for the Desbarats Mining Co., Limited, Desbarats, Algoma.

758 Chalcopyrite in slate and chlorite schist. Massey mine, near Massey station, Sault Branch C. P. R., in Salter township, Algoma District. A concentrating ore. Development of the vein is being actively pushed. The large specimens are from the main shaft and from the tunnel.

Ontario Smelting Co., Massey, Algoma.

160, 833 Chalcopyrite in quartz. Bruce Copper Mines near Bruce Mines station, Sault Branch C. P. R. Specimen No. 833 weighs 2½ tons and was taken from the mine specially for this exhibit. It assays about 4 or 4.5 per cent. copper and closely represents the average ore of this property. It is eminently a concentrating ore and for the purpose of treating it a large plant has been erected which starts work in May.

The Bruce Copper Mines, Limited, London, Eng.

891, 892, 893, 894 Chalcopyrite in quartz. Rock Lake mine, about 9 miles north of Bruce Mines station, Sault Branch C. P. R., Algoma. The specimens weigh in all about 4 tons and were taken from the vein for this exhibit. The vein is exposed for about 3 miles across the company's properties varying in width from 17 to 46 feet between walls of slate. The vein filling is composed of a quartz magma containing chalcopyrite and bornite in varying quantities.

Rock Lake Mining Co., Bruce Mines, Ont.

Sudbury Region.

Copper in this region is obtained as a constituent of the copper-nickel ores, occurring as chalcopyrite closely associated with nickeliferous pyrrhotite. The heavy sulphide ores contain but little gangue and are consequently roasted and smelted without any preparatory concentration treatment.

For a fuller description of the copper mining industry of this district see under "Copper-Nickel."

34 Pyrrhotite and chalcopyrite. Stobie mine, Blezard township, Nipissing District, about 4 miles north of Sudbury.
Canadian Copper Co, Sudbury, Ont.

217 Chalcopyrite Vermilion mine, Denison township, Algoma District.
Bureau of Mines.

264 Chalcopyrite and calcite in quartz. Creighton township, Algoma District. Owned by T. Foster, Sudbury.
Collection of J. F. Black, Sudbury.

267 Chalcopyrite. Township of Porter, Algoma District. Owned by N. Townsend, Sudbury.
Collection of J. F. Black, Sudbury.

269 Chalcopyrite, galena and zincblende. Location on Trout lake in Lumsden township, Algoma District. Vein 8 feet wide. Owned by A. Proulx, Sudbury.
Collection of J. F. Black, Sudbury.

319a
305 } Chalcopyrite in quartz
286

280 Chalcopyrite and pyrrhotite in quartz. Century mine in Graham township, Algoma District. The property is now being developed with good results, some assays giving, it is said, 7% to 13% copper and from a trace to $26.00 gold per ton. Owned by F. Foster and J. F. Black, Sudbury.
Collection of J. F. Black, Sudbury.

285 Chalcopyrite in quartz and felspar. Location in Davis township, Nipissing District. Owned by the Great Lakes Copper Co, Sudbury.
Collection of J F. Black, Sudbury.

292 Native Copper. Dominion location.
Collection of J. F. Black, Sudbury.

296 Chalcopyrite in quartz and diorite. From a dike in Sudbury District.
283 Chalcopyrite. Sudbury District. Location owned by J. F. Black.
Collection of J. F. Black, Sudbury.

301 Chalcopyrite in diorite. Wright property.
Collection of J. F. Black, Sudbury.

293 Bornite and chalcopyrite. Location in Tarbutt township. Owner, Jas. Stobie.
Collection of J. F. Black, Sudbury.

321 Azurite in quartz. Porcupine property.
Collection of J. F. Black, Sudbury.

323 Chalcopyrite in quartz. Hog's Back property.
Collection of J. F. Black, Sudbury.

326a Chalcopyrite. Lot 13, concession V, Rathbun township, Nipissing District.
Wm. McVittie, Toronto.

Parry Sound.

The principal properties all lie within a few miles of the town of Parry Sound and within easy reach of both railways and waterways, being in many cases immediately on the shores of Georgian Bay. Attention was first attracted to the district by the discoveries of free gold in 1894 at what is now the McGown mine, but the values in this metal proved to be so small that despite the fair amount of copper present, the property was abandoned until 1898 when the finding of large masses of bornite and chalcocite a few hundred feet from the original workings once more excited interest. Since then considerable development and actual mining have been done and numerous shipments of ore sent to the smelters, from the McGown and several other properties.

The McGown deposits form massive impregnations of indefinite outline lying in a sheared zone of the diorite country rock, this mineralized belt measuring from 250 to 400 feet in width and 1000 feet in length. The ore is composed of a mixture of gangue rock with bornite, chalcocite, chalcopyrite with some pyrite, these minerals being probably formed by replacement of the country rock. An ordinary 10-stamp mill with Frue vanners was erected on the property in 1899.

The Wilcox mine, a property some miles distant, has also been acquired by the same company and development is under way. The deposit differs somewhat from that of the McGown, being practically a fahlband in the grey garnetiferous gneiss of the region.

The "Blanche B", a recently acquired property situated on Wilcox island, has been explored during the past season with promising results. The length of lode exposed on the surface is 350 feet, and it is reported to have been traced from this island over other locations to a distance of four miles. The width on Wilcox island as uncovered is about 39 feet. The deposit carries copper and zinc ore in about equal values. Other properties of importance are the Hattie Bell and McQuade, the deposit in the latter occurring as massive bornite impregnated through an amphibole schist.

In the county of Frontenac and adjoining counties there is what appears to be a promising field for copper mining. Several finds of copper pyrites have been made there recently, but owing to their being little more than prospects as yet, no collection of specimens was obtainable.

3, 3a } Chalcopyrite and pyrrhotite

16 Pyrite and chalcopyrite

17 Bornite and chalcopyrite.

26 Chalcopyrite. Parry Sound, Ont.
Bureau of Mines.

68 Pyrrhotite and chalcopyrite. Foley township, Parry Sound District.
D F Macdonald Parry Sound, Ont.

145 Chalcopyrite and pyrrhotite. Lafex or Hattie Bell mine on lot 35, concession A, Foley township, Parry Sound District.
Hattie Bell Copper, Gold and Nickel Mining Co., Parry Sound, Ont.

25, 385, 386 } Bornite and chalcopyrite. McGown mine in Foley township, Parry Sound District, 14 miles southwest from the town of Parry Sound. Mining operations have been carried on for the past few years and a large quantity of ore has been extracted. The deposit covers a large surface area and is composed of sulphides of copper, iron and zinc. A 10-stamp mill and concentrating machinery has been installed on the property.
Parry Sound Copper Mining Co., Limited, Parry Sound, Ont., and St. Paul, Minn.

259 Chalcocite, bornite and chalcopyrite. Goddard mine, Parry Sound District.
Milton Pearce, Parry Harbor, Ont.

526 Copper pyrites. Mountain property.
C. A. Phillips, Parry Sound, Ont.

527 Copper pyrites. McDonald property. Different assays of samples from this vein gave:
Copper, 8%; 10.24%; 44.86%.
Gold,.....trace ; $1.60 per ton.
C. A. Phillips, Parry Sound, Ont.

528 Copper pyrites. Three Island property.
C. A. Phillips Parry Sound, Ont.

529 Copper pyrites. Wallbridge property.
C. A. Phillips, Parry Sound, Ont.

530 Copper pyrites. Bear lake property.
C. A. Phillips, Parry Sound, Ont.

928 Bornite, chalcopyrite and zincblende. Wilcox mine, Cowper township, Parry Sound District, 14 miles southwest from the town of Parry Sound. Development recently started discloses a rich deposit composed of the sulphides of copper, zinc and iron.
Parry Sound Copper Mining Co., Limited, Parry Sound, Ont., and St. Paul, Minn.

154 Chalcopyrite. Dummer property, Peterborough county.
J. B. McWilliams, Toronto.

277 Chalcopyrite in quartz. Lake Temiscaming, Nipissing District. Samples said to assay fairly well in both copper and gold. Owned by C. A. McCool, Mattawa.
Collection of J. F. Black, Sudbury.

288 Chalcopyrite and bornite in quartz. Location on Lake Temagami, Nipissing District. Owner, J. F Black, Sudbury.
Collection of J. F. Black, Sudbury.

60 Pyrrhotite and Chalcopyrite. Net lake, near lake Temagami, Nipissing District.
D. O'Connor, Sudbury.

289 Chalcopyrite and galena in quartz From a vein in Northern Algoma.
Collection of J. F. Black, Sudbury.

307 Chalcopyrite and galena in quartz.
297 Chalcopyrite in calcite.
From unsurveyed lands, northern Algoma.
Collection of J. F. Black, Sudbury.

221 Chalcopyrite. North Burgess township, Lanark county.
Bureau of Mines.

COPPER-NICKEL.

Nickel is one of the most important of Ontario ores, and there appears to be inexhaustible supplies of it in that part of the country lying north of Georgian Bay. Nearly 50 years ago nickel with copper was first found on what was known as the Wallace location near the mouth of the Whitefish river, but not in paying quantities, and not until the construction of the Canadian Pacific railway were the important discoveries made in the Sudbury district which have since led to the growth of a great mining industry in this region. A railway cutting through one of the rocky ranges exposed a body of copper pyrites which at a later date, in 1884, was ascertained to carry nickel as well, and since then explorations and development have proven that in the Sudbury region is situated one of the two great sources of the world's supply of nickel.

The uses to which nickel is being applied cover a very extensive field, and chief among them is the production of nickel-steel. This alloy has many applications and is daily being tried for new purposes. Perhaps the most important of these is the manufacture of armor and heavy ordnance where its great strength, toughness and non-fissibility are of importance. The peculiar resistance to fatigue under vibration makes its very desirable for piston rods in engines, rock drills, etc.; in fact its qualities for almost every use are so superior to those of the ordinary steel that in spite of the extra cost it is every day becoming more of a necessity in the arts.

The following table gives the nickel production of Ontario for the last seven years:

Year.	Quantity.
1894	2331 metric tons.
1895	2099 "
1896	1766 "
1897	1813 "
1898	2525 "
1899	2605 "
1900	3161 "
Total	16300 "

Although these statistics are given in terms of nickel, no fine nickel is as yet produced in Ontario. The reduction of the ore proceeds only to the making of matte which is then shipped to other countries, principally to the United States, for the final treatment.

The following is a summary of the method of treatment of the Ontario ores, consisting of chalcopyrite and pyrrhotite with accompanying rock matter.

The ore after coarse crushing is piled in a special manner in heaps upon a foundation of wood; the wood is fired and almost immediately the sulphur in the ore commences to burn and continues to do so without any further addition of fuel until the sulphur contents are reduced from about 30 to 7 per cent. These piles hold from 600 to 3000 tons of ore and burn from 6 to 20 weeks.

The roasted ore is then removed to the smelters. These are of the Herreshof pattern, water-jacketted and of a capacity of 125 tons a day, producing 15 tons matte. The average contents of the Sudbury matte are:

Copper	20 to 25 per cent.
Nickel	18 " 23 "
Iron	25 " 35 "
Sulphur	26 " 33 "

Most of this matte is shipped to New Jersey and refined there by the Orford Copper Co., by what is known as the Orford or alkaline-sulphide process. This method depends on the fact that if a fairly rich nickel-copper matte be smelted with sulphate of soda and coal the sulphides of copper and iron unite with the sulphide of soda produced in the process to form a very fusible mass, while the nickel sulphide, which is of greater specific gravity, sinks to the bottom fairly free from the other two metals. Upon cooling there is a distinct line of separation visible and the nickel sulphide in a yellowish white mass is readily removed from the dark irridescent iron-copper matte. This nickel sulphide, which contains only very small quantities of copper and iron, is simply roasted with a little sodium to produce the nickel oxide of commerce. If the metal is required the oxide is mixed with some carbonaceous material and ignited. It may afterwards be fused and cast as usual.

The nickel thus produced is not sufficiently pure for certain purposes, so some of the crude metal is sold to the Balbach Smelting Works, N.J., where it is further refined by an electrolytic process which as yet remains a trade secret.

A new plant is now about completed at Hamilton, Ont., for the refining of nickel-copper mattes by the Frasch process, the metals to be obtained electrolytically by the employment of chloride instead of sulphate or cyanide solutions.

Sudbury Region.

In various other parts of Ontario masses of pyrrhotite are known to exist, but there is no region where they are so numerous and in such proximity to one another, nor as yet is it known that they are nickelferous to an economic degree, whereas in the Sudbury district most of the deposits so far tested carry nickel in paying quantities. The pyrrhotite is always found accompanied by greenstone, the usual situation being at the junction of this with some other rock, especially granite, gneiss and felsite. The area over which the ore has been discovered, or in other words, the Sudbury region, is of elliptical form, and measures roughly about 70 miles from southwest to northeast and 50 miles from southeast to northwest.

The ores of the locality are either chalcopyrite or pyrrhotite, or more commonly a mixture of the two. The chalcopyrite is often found of a fair degree of purity in pockety masses in the mixed ore, while vast bodies of pyrrhotite with little or no chalcopyrite are found here and there in the district. Associated with these common minerals are small quantities of those which contain nickel as an essential constituent, such as millerite, pentlandite, and others, which carry large percentages of the metal and thus raise the general richness of the mass. The nickel appears to be present in the pyrrhotite of these ores replacing some of the iron; it is variable in quantity but on the average forms about 2 or 3 per cent. of the ore. Occasionally richer masses in which may be discovered often the nickel minerals above mentioned, are found yielding as much as 8 or 9 per cent., but these bonanzas are not very common. The smelting ore during the seven years ending 1900 has averaged 2.51 per cent. nickel and 2.92 per cent. copper.

The Canadian Copper Company is the pioneer of the nickel industry at Sudbury and since its first operations on the original Copper Cliff property in 1886 it has acquired and worked numerous others, the chief of which are the Evans, McArthur No. 1 and No. 2, Clara Belle A & B, Macdonald, Stobie and Six and Six. The Copper Cliff lies about 4 miles west of Sudbury, the other mines mentioned all being within a short distance. It is being worked to below

the 1000-foot level, a considerably greater depth than that to which any other mine in the region has as yet attained. The Company is operating two large smelter plants on the property, these containing in all some 9 blast furnaces. These mines are represented in the exhibit by a very complete collection of specimens.

The Great Lakes Copper Company acquired properties north of Sudbury in Blezard township, and has recently erected a smelter of an original design, hoping to more economically treat the ore.

The Victoria Mines in Denison township now are operating what is probably the finest smelting plant in the region. It was but recently completed on their property and since has run steadily.

The Gertrude mine in Creighton township, owned by the Lake Superior Power Company, though not as yet extensively developed, is a promising property. A large collection of ore samples from this mine are on exhibition.

The other nickel properties in the region are numerous, and many are represented in the exhibit which have not been touched in this outline.

258 Nickeliferous pyrrhotite. Mount Nickel mine, Blezard township, 5 miles north of Sudbury, Nipissing District.
The Great Lakes Copper Co., Sudbury, Ont.

262 Nickeliferous pyrrhotite. Mount Nickel mine, owned by the Great Lakes Copper Co., Sudbury.
Collection of J. F. Black, Sudbury, Ont.

268 Pyrrhotite in contact with quartzite. Falconbridge mine. Owners, Cochrane & McVittie, Sudbury.
Collection of J. F. Black, Sudbury, Ont.

270 Pyrrhotite. Lot 2, concession IV, Levack township, Algoma District. Owner, James Stobie, Sudbury.
Collection of J. F. Black, Sudbury, Ont.

271 Nickeliferous pyrrhotite. Trilla Belle mine, Trill township, Algoma District. Owned by Great Lakes Copper Co., Sudbury, Ont.
Collection of J. F. Black, Sudbury, Ont.

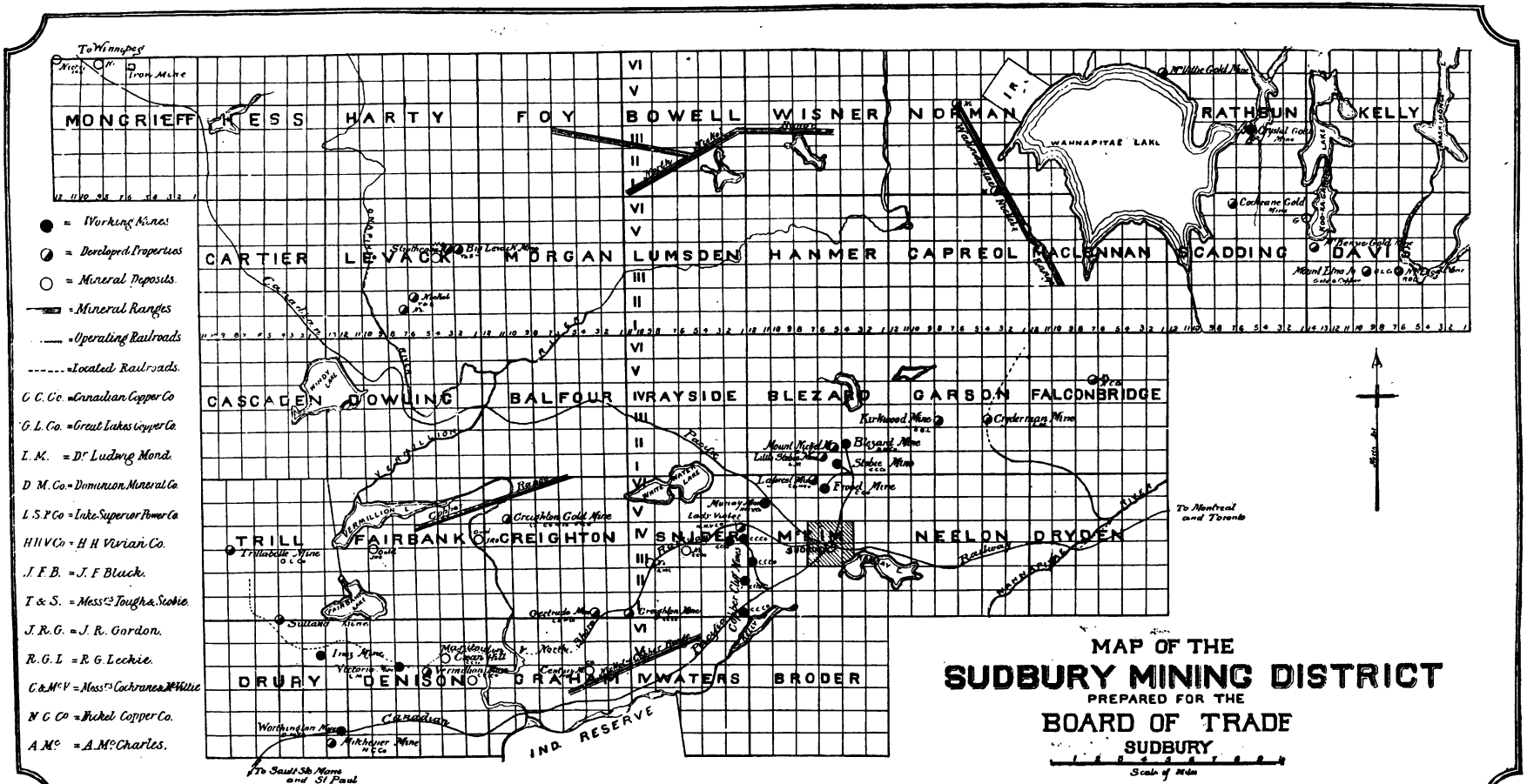
273 } Nickeliferous pyrrhotite. Strathcona mine, Levack township, Algoma Dis-
292a } trict. Considerable surface prospecting and shaft sinking has been done on this deposit, which shows it to be an extensive one. Owned by J. F. Black, Sudbury, Ont.
Collection of J. F. Black, Sudbury, Ont.

287 Chalcopyrite and pyrrhotite. Worthington property. These sulphides are said to be very rich in nickel: Owners, The Dominion Mineral Co.
Collection of J. F. Black, Sudbury, Ont.

295 Pyrrhotite. North Star claim, Sudbury District. Owner, A. McCharles, Sudbury, Ont.
Collection of J. F. Black, Sudbury, Ont.

298 Pyrrhotite. Sultana location, between Drury and Trill townships, Algoma District.
Collection of J. F. Black, Sudbury, Ont.

310 Pyrrhotite. Lot 8, concession IV, Norman township, Nipissing District. Property owned by N. G. McConnell.
Collection of J. F. Black, Sudbury, Ont.


MAP OF THE
SUDBURY MINING DISTRICT
PREPARED FOR THE
BOARD OF TRADE
SUDBURY
Scale of Miles
MONCRIEFF
KESS
HARTY
FOY
BOWELL
WISNER
NORMAN
RATHBUN
KELLY
CARTIER
LEVACK
MORGAN
LUMSDEN
HANMER
CAPREOL
MACLENNAN
SCADDING
DAVIS
CASCADEN
DOWLING
BALFOUR
RAYSIDE
BLEZARD
GARSON
FALCONBRIDGE
TRILL
FAIRBANK
CREIGHTON
SNIDER
MACK
NEELON
DRYDEN
DRURY
DENISON
GRATHAM
WATERS
BRODER
WAHNAPITAE LAKE
Canadian Pacific Railway
To Winnipeg
To Montreal and Toronto
To Sault Ste Marie and St Paul
IND. RESERVE
Working Mines
Developed Properties
Mineral Deposits
Mineral Ranges
Operating Railroads
Located Railroads
C C Co. = Canadian Copper Co
G L Co. = Great Lakes Copper Co
L M. = Dr Ludwig Mond
D M Co. = Dominion Mineral Co
L S P Co = Lake Superior Power Co
H H V Co = H H Virian Co.
J F B. = J F Black.
T & S. = Messrs Tough & Stobie.
J R G. = J R. Gordon.
R G L = R G Leckie.
C & M C V = Messrs Cochrane & McVittie
N C Co = Nickel Copper Co.
A M C = A McCharles.
E V Rourke, O.L.S. N.E.

VICTORIA MINES, SUDBURY DISTRICT: REDUCTION WORKS AND CONVERTOR PLANT.

[8] ONTARIO SMELTING COMPANY'S WORKS, SUDBURY DISTRICT.

313 Pyrrhotite. Falconbridge township, Nipissing District. Owners, Messrs. Cochrane & McVittie, Sudbury, Ont.
Collection of J. F. Black, Sudbury, Ont.

318 Pyrrhotite. Algoma District.
Collection of J. F. Black, Sudbury, Ont.

320 Pyrrhotite Location in Cartier township, Algoma District. A large outcrop, but undeveloped.
Collection of J. F. Black, Sudbury, Ont.

324 Pyrrhotite. Location W R 22, Sudbury District. Owner, L. V. Rorke, Sudbury, Ont.
Collection of J. F. Black, Sudbury, Ont.

339 Pyrrhotite. Lot 2. concession III, Nairn township, Algoma District. Said to assay on average 2.82% nickel and 4% copper.
Collection of Mines Contract & Investigation Co. of Toronto, Limited.

357 Gersdorffite.
358 Nickeliferous pyrrhotite and chalcopyrite. North Worthington property, situated on W ½ lot 12, concession II, Denison township, Algoma District, comprising 229½ acres. The C. P. R. line crosses the location about ¼ mile from Worthington station. The deposit is from 60 to 107 feet wide and crosses the lot. Stringers or smaller veins composed largely of gersdorffite and as wide as 4 feet in one case cut through the main body irregularly. This nickel arsenosulphide (gersdorffite) forms the richest pockets of nickel ore found in the Sudbury district. Little development has been done on this lode.
Hiram Robinson, Ottawa, Ont.

362 Nickeliferous pyrrhotite and chalcopyrite Totten mine, Drury township, Algoma District. The samples are taken from the deposit at a depth of 60 feet and are said to give assays of 6 per cent. nickel and 2 per cent. copper. Another sample represented by this ore ran 20 per cent. copper.
The Canadian Nickel Co., Worthington, Ont.

363 Nickeliferous pyrrhotite and chalcopyrite. Howland mine, Algoma District. Assays of the ore from the surface of this property are said to give from 2 per cent. to 30 per cent. copper and 8 per cent. nickel.
The Canadian Nickel Co., Worthington, Ont.

374 Nickeliferous pyrrhotite and chalcopyrite
379 Nickeliferous pyrrhotite and chalcopyrite An analysis of this specimen gives:—

Insoluble	3.0 per cent.
Copper	4.5 "
Nickel	3.5 "
Iron	55.0 "
Sulphur	32.0 "

Victoria mines, Denison township, Algoma District.
Ludwig Mond, F.R.S., 20 Avenue Road, Regent's Park, London, N.W., Eng.

801 Nickeliferous pyrrhotite and chalcopyrite. Worthington mine, Drury township, Algoma District. This specimen assays, nickel, 6 per cent.; copper, 3 per cent.
Nickel Copper Co., Worthington, Ont.

394 Pyrrhotite, chalcopyrite and pyrite From Lake Temagami district.
394a Gersdorffite and niccolite. Denison township, Algoma District.
D. O'Connor, Sudbury, Ont.

804, 805 } Nickel rail
806 Copper-nickel matte
807 Copper "tops"
808 Nickel "bottoms"
809 Light nickel oxide
810 Dark nickel oxide
811 Nickel shot
812 Concentrated matte
813 Norwegian nickel ore
814 New Caledonia nickel ore.
815 Nickel ribbon.
816 Nickel blocks
817 Nickel plaquettes
818 Nickel anode
818a Nickel cathode
820 Copper anode
821 Copper cathode
819 Nickel wire bars
821a Section of nickel-steel armor plate, made by the Carnegie Steel Company.

The Orford Refining Works, N.J. The above collection comprises the various products obtained in refining copper-nickel matte produced from smelting the Canadian Copper Company's Sudbury ores. The matte is shipped to the Orford Copper Company's works in New Jersey, U. S., and there refined.

The Orford Copper Company, New York, N. Y.

395 Nickeliferous pyrrhotite and chalcopyrite. North Star mine, Sudbury district. Samples from different parts on the surface of this deposit are said to assay, Copper, 22 5 per cent.
" 2.0 "
Nickel, 4.0 "
" 4 5 "

A. McCharles, Sudbury, Ontario.

954 Nickeliferous pyrrhotite. Gertrude mine, Creighton township, Algoma district. At the Gertrude mine three shafts have been sunk, a tunnel driven, and a crushing plant of 500 tons capacity per day installed. Sufficient ore for two years operations has already been mined. The ore carries from 4 per cent. to 7 per cent. nickel, 33 per cent. sulphur and from a trace to about 0.3 per cent. copper. The sulphur is used in the manufacture of wood pulp at the Sault Ste. Marie works.

The Lake Superior Power Company, Sault Ste. Marie, Ontario.

72 Whartonite. Beatrice mine, south ½ lot 1, concession III, Blezard township, Nipissing district.

E. H. Davis, Montreal, Quebec.

958 Roasted pyrrhotite.
959 Briquettes of roasted pyrrhotite.
961 Ferro-nickel.

From the metallurgical works of the Lake Superior Power Company, Sault Ste. Marie, Ontario.

951a Nickeliferous pyrrhotite and chalcopyrite. Copper cliff mine. Copper, 23.78 per cent.; nickel, 1.25 per cent.

951b Nickeliferous pyrrhotite and chalcopyrite. Copper Cliff mine. Copper, 0 51 per cent; nickel, 9.25 per cent.

951g Nickeliferous pyrrhotite and chalcopyrite. Stobie mine. Copper, .37 per cent; nickel, 2 99 per cent.

951j Nickeliferous pyrrhotite and chalcopyrite Stobie mine. Copper, .37 per cent.; nickel, 2.99 per cent

951k Nickeliferous pyrrhotite and chalcopyrite. Stobie mine. Copper, .37 per cent.; nickel, 2.99 per cent

951p Nickeliferous pyrrhotite and chalcopyrite Stobie mine. Copper, 24.23 per cent; nickel, .64 per cent.

951h Nickeliferous pyrrhotite and chalcopyrite. Number Two mine. Copper, .38 per cent.; nickel, 4.70 per cent

951i Nickeliferous pyrrhotite and chalcopyrite Number Two mine. Copper, 13.76 per cent.; nickel, 1.87 per cent.

951o Nickeliferous pyrrhotite and chalcopyrite Number Two mine. Copper, 13.76 per cent.; nickel, 1.87 per cent.

951n Nickeliferous pyrrhotite and chalcopyrite. Number Two mine. Copper, 13.76 per cent; nickel, 1.87 per cent

951c Nickeliferous pyrrhotite and chalcopyrite Number Three mine. Copper, .42 per cent.: nickel, 4.85 per cent.

951d Nickeliferous pyrrhotite and chalcopyrite Number Four mine. Copper, 1 39 per cent.; nickel, 4 33 per cent.

951e Nickeliferous pyrrhotite and chalcopyrite Number Four mine. Copper, 1 39 per cent.; nickel, 4 33 per cent.

951f Nickeliferous pyrrhotite and chalcopyrite Number Four mine. Copper, 1.39 per cent; nickel, 4.33 per cent

951l Nickeliferous pyrrhotite and chalcopyrite Number Four mine. Copper, 2.49 per cent.; nickel, 4.15 per cent.

951m Nickeliferous pyrrhotite and chalcopyrite Creighton mine. Copper, 1 81 per cent.; nickel, 7.03 per cent.

951q Nickeliferous pyrrhotite and chalcopyrite. Number Two extension. Copper, .35 per cent.; nickel, 4.32 per cent.

951r Roasted ore Copper, 2 07 per cent; nickel, 2.82 per cent.

951v Vermilion mine dirt.

951w Granulated slag.

951s Bessemer matte Copper, 45.88 per cent; nickel, 33.51 per cent.

951t Standard matte Copper, 15.60 per cent.; nickel, 19.48 per cent.

952 Nickel-steel. Made in the United States.

The above specimens represent the ore from the several working mines which belong to this company. The mines are all situated in the vicinity of Sudbury, and most of them close together, the main smelting plant being at Copper Cliff. Some of the samples show a predominance of nickel, and others of copper, the rest being average. The largest piece weighs about 4 tons, while the whole exhibit amounts to 14 or 15 tons.

The Canadian Copper Company, Copper Cliff, Ontario.

73 Pyrrhotite. From eighth level.

73a Pyrrhotite. From ninth level.

Copper Cliff mine, Sudbury district.

The Canadian Copper Company, Copper Cliff, Ontario.

73b Pyrrhotite. Worthington mine, Drury township, Algoma District.

The Nickel-Copper Company, Worthington, Ontario.

73c Pyrrhotite Locations in Trill township, Algoma District.

The Duluth Copper Company, Duluth, Minn.

73d Pyrrhotite. Locations in Drury township, Algoma District.
The Chicago Nickel Company, Worthington, Ontario:

896 Solution in acid of copper-nickel matte.
897 Solution of nickel chloride, after removal of copper and iron
898 Solution of ammoniated nickel and copper with nickel precipitated therein
899 Crystallized nickel ammonium chloride.
900 Solution of ammoniated cobalt, after removal of copper, nickel and iron
901 Fused caustic soda
902 Precipitated nickel oxide
903 Metallic copper
904 Metallic electro-nickel.

Metallurgical works of the Nickel-Copper Company, at Hamilton, Ontario. These solutions and products are representative of the Frasch electrolytic process used in refining the Sudbury copper-nickel mattes.
The Nickel-Copper Company of Ontario, Limited, Hamilton, Ontario.

Other Localities.

In western Ontario two very similar deposits have been found within the last year which are said to carry nickel. One is on the Little Turtle river about 20 miles from its mouth on Little Turtle lake, and the other is near Bear's Pass north of Swell bay, Rainy lake. The deposits have not been prospected to any extent as yet, but so far show a mixture of sulphides of iron and copper with quartz and other rock matter, the specimens in the exhibit showing their character fairly well.

North of Lake Superior four miles and near Rossport a deposit of sulphides composed chiefly of pyrrhotite was found some years ago and named the Moccasin mine. This also contains nickel. A collection is exhibited from this property.

At Hawk lake on the boundary between the Provinces of Ontario and Manitoba, and 2 miles from Ingolf station, C.P.R., there is an extensive deposit of sulphides, principally pyrrhotite, which contain nickel, copper and gold. No development work beyond prospecting the ore body has been undertaken as yet.

176 Pyrrhotite and chalcopyrite. Lots 26 and 27, concession VII, Hardy township, Parry Sound District.
Kelcey, Rath, Woodcock and Co., Prospectors, Loring P.O., Ont.

251, 332 Pyrrhotite and pyrite. Moccasin location, 6 miles northeast of Rossport, Lake Superior. A deposit of sulphides one to three feet wide occurs here in the contact between granite and a green trap rock. Samples of the pyrite are said to carry nickel.
John Bowman, Rossport, Ont.

372, 855 Chalcopyrite and pyrrhotite. Location near Magnetewan river, Chapman township, Parry Sound District. Assays made at the Belleville Assay Office on samples from the vein are as follows:

1. Sample composed of quartz, hornblende, pyrite, chalcopyrite, and pyrrhotite,—copper, 6.17 per cent.; nickel, 0.41 per cent.

2. Sample composed of pyrrhotite with quartz, pyrite and chalcopyrite, —copper, 10.32 per cent. The vein is several inches wide on the outcrop but is widening with depth.

John Schmeler, Magnetawan, Ont.

735 **Pyrrhotite.** From a location on Hawk lake, just over the boundary of Rainy River District, in Manitoba and two miles from the C.P.R. station of Ingolf, Ontario. The vein on the property is said to be 18 to 20 feet wide and traceable for several thousand feet, and to be in a contact between granite and trap rocks. The vein matter is composed of quartz said to carry values in gold, silver, copper and nickel in paying quantities.

Neil Martin, Winnipeg, Man.

926 **Iron sulphide.** Location on Nickel lake a few miles northeast of Rainy lake, Rainy River District. The deposit is a body of quartz and sulphides in places 40 feet wide, and traced over 300 feet in length. It is said to be nickeliferous.

W. A. Preston, Winnipeg, Man., or Mine Centre, Ont.

927 **Iron sulphide.** Locations on Little Turtle river, Rainy River District. A deposite of quartz and sulphides traced for several hundred feet and prospected by some test pits from which the specimens were taken. Said to be nickeliferous.

O. B. Robinson, Mine Centre, Ont.

942 **Chalcopyrite and pyrrhotite.** Frank McLaughlin property on Pike lake, lot 17, concession VIII. Armour township, Parry Sound District, and three miles east of Burks Falls, G. T. Ry. The deposit outcrops on a hill, is traceable for a considerable distance and is said to carry nickel as well as copper. Development work is being done by the Magnetawan Mining Co. The specimens come from a depth of 35 feet.

Stephen T. Evans, Burks Falls, Ont.

IRON.

During the last year there have been two additions to the iron mining regions where active development has progressed, namely Michipicoton and Atikokan. The iron deposits are undergoing careful explorations by both Government and private surveys with the result that the ranges are being thoroughly defined. So far they show up with great promise, especially in the Michipicoton division where the conditions more nearly coincide with those of the iron ranges of Minnesota than in any other part of Ontario. The output of the mines was considerably increased during the year 1900 by the addition of the Helen mine, Michipicoton, to the other producing properties of eastern Ontario, amounting to 90,302 tons, valued at the mine at $111,805, as against 16,911 tons in 1899 valued at $30,951.

The recent opening of the Ontario and Rainy River branch of the Canadian Northern railway west from Port Arthur has made accessible both the Mattawin and Atikokan iron ranges, and at the latter, extensive diamond drill prospecting is already well advanced.

Eastern Ontario.

The mines here are being worked on a moderate scale only, apparently from disinclination on the part of owners to undertake a thorough system of development that would put the mines in a state to ship continuously and on a large scale instead of intermittently as at present. The working mines are confined to the counties of Frontenac, Hastings and Lanark. The geological conditions of some of these deposits are such as to warrant the belief that well-directed operations will put ore bodies in sight that can be very profitably mined. The ore is in most cases magnetite, sometimes associated with small quantities of sulphides of iron and quartz nodules.

The Wilbur is the most extensively developed iron property in this region, and is more or less typical of most of the other adjoining mines. It is situated in Lavant township, Lanark County. The ore is magnetite, which lies between walls of crystalline limestone on the one side and gneissoid and schistose rocks on the other, the latter showing some intrusions of felsitic dykes. Along both walls of the deposit are bands of amphibole schist The vein filling is a massive magnetite containing a little calcite but remarkably free from silica and pyrite, differing in this latter from other similar deposits, which as a rule contain an appreciative per cent. of disseminated quartz and pyrites.

The other iron mines of this region from which specimens are shown, are the Calabogie, Wallbridge, Coe Hill, Seymour and numerous other properties.

10 **Magnetite** Belmont iron mine, Belmont township, Peterborough county; showing glacial striae; from large bed of ore.
T. D. Lydyard, Toronto.

20 **Magnetite** Olrig township, Nipissing District.
J. J Rochester, Mattawa, Ont.

32 **Hematite** Lot 5, concession V, Dalhousie township, Lanark county.
Bureau of Mines.

49 **Magnetite** Hastings county.
Wm. Armstrong, Glanmire P.O., Ont.

50 **Magnetite** Calabogie, Renfrew county.
Geological Survey.

53 **Magnetite** Galway township, Peterborough county.
Mr. Dumble, , Ont.

79 **Hematite** Lot 18, concession IX, South Crosby township, Leeds county.
J. C. Judd.

89 **Magnetite and graphite.** Madoc, Hastings county.
Stephen Wellington, Madoc, Ont.

139 **Magnetite** Wilbur mine, Wilbur, K. & P. Ry., Lanark county.
Wm. Caldwell, Rosedale, Toronto.

155 **Hematite** J. A. mine, Rutherford township, north shore of Lake Huron, Algoma District.
Capt. F. Tronch, Goderich, Ont.

164 **Hematite** Wallbridge mine, 4 miles south of Eldorado station, C. O. Ry., Hastings county. The specimen is first-grade ore. A large quantity of this ore has been shipped to the Hamilton Steel & Iron Co., Hamilton, to be smelted.
C. M. Wallbridge, Madoc, Ont.

166 **Hematite.** Empey mine, Hastings county.
H. C. Farnum. Eldorado P.O., Ont.

167 **Hematite.** Brennan mine, situated in east half of lot 7, concession VI, Madoc township, Hastings county. This property has been but recently opened up and no shipments made as yet.

J. C. Brennan, Ottawa.

173 **Magnetite.** Lee's mine, near Gilmour, C O. Ry., Hastings county.

R. E. Lee, Madoc, Ont.

174 **Magnetite** Coe Hill mine, near Coe Hill, C. O. Railway, Hastings county. A large deposit; carries some sulphur.

A. T. Longnecker, Coe Hill, Ont.

197 **Magnetite** Lee-Mills mine, ½ mile from Gilmour, C. O.. Railway, Hastings county. Ore is being shipped to the Hamilton Steel & Iron Company's furnace at Hamilton, Ont. An analysis of the ore made at the Bureau of Mines, Belleville Assay Office, is as follows:

Total metallic iron	64 170 per cent.
Silica	5.780 "
Sulphur	0.206 "
Titanium dioxide	nil

R. E. Lee, Madoc, and J. H. Mills, Belleville, Ont.

242 **Magnetite** Embury property, Hastings county. Said to assay 55.34 per cent. metallic iron.

H. Eckert, Madoc, Ont.

248 **Magnetite.** Seymour mine, Hastings county. An analysis of this magnetite gave:

Iron	66 12 per cent.
Silica	3.56 "
Phosphorus	0.002 "
Alumina	1.93 "
Lime	0.41 "
Magnesia	1.23 "
Sulphur	0.018 "

S. Wellington, Madoc, Ont.

364 **Magnetite.** Lot 26, concession VI., South Canonto township, Frontenac county.

H. Robinson, Ottawa, and R. McGregor and W. Yuill, Calabogie, Ont.

365 **Magnetite.** Lot 25, concession V., Darling township, Lanark county. The vein has been partially explored underground to a depth of 60 feet and is there reported 30 feet wide. About 2,000 tons have been shipped to the Hamilton furnaces.

H. Robinson, Ottawa, and R. McGregor and W. Yuill, Calabogie, Ont.

380 **Magnetite** St. Charles mine, Tudor township, Hastings county. Shipments of the ore are now being made to the Hamilton furnace. Mine owner, T. C. Gordon.

D. E. K. Stewart, Madoc, Ont.

492 } 515 } **Magnetite.** Glendower mine, Bedford township, Frontenac county. Contains 62 per cent. metallic iron.

Bureau of Mines.

495 **Magnetite** Lots 9 and 10 (400 acres), concession VIII., Bathurst township, Lanark county. An assay of the ore gives:

Metallic iron	65.07 per cent.
Water	1.48 "
Silica	7.00 "
Phosphorus	0.06 "

John Hart, Perth, Ont.

498 } Magnetite. Lot 7, concession X., Portland township, Frontenac county.
499 }

504 Magnetite. Lot 17, concession VIII., Wollaston township, Hastings county.
Messrs. Clute & Browne, Belleville, Ont.

506 Magnetite. Lot 10, concession VI., Madoc township, Hastings county.
J. A. Wallbridge, Belleville, Ont.

512 Hematite. Lots 23 and 27, concessions XI. and XII., Darling township, Lanark county.
James Bell, Lanark, Ont.

514 Magnetite. Lot 25, concession V., Darling township, Lanark county. The iron ore contains by assay, metallic iron 66.00 per cent. to 68.85 per cent.; phosphorus 0.026 per cent.
Bureau of Mines.

522 Magnetite. Wollaston township, Hastings county.
Jenkins & Chambers, Madoc, Ont.

523 Magnetite. Lot 18, concession VIII., Wollaston township, Hastings county. From a depth of 20 feet.
Messrs. Clute & Browne, Belleville, Ont.

517a Magnetite (black bessemer). Roberts mine on K. & P. Ry., lots 3 and 4 concession IX., Palmerston township, Frontenac county. Carries 65.00 per cent. iron and is free from sulphur.
F. W. Ferguson, Winnipeg, Man.

734 Bog Iron Ore (limonite). Lot 28, broken front concession, Gainsborough township, Lincoln county, and near Fenwick station, T. H. & B. Ry.
Henry E. Davis, Fenwick, Ont.

736 Hematite. Wollaston township, Hastings county.
Henry Johnson, Coe Hill, Ont.

738 Magnetite. Lot 25, concession IV., Snowdon township, Haliburton county.
Bureau of Mines.

785 }
786 } Magnetite. Imperial mine. Lot 23, concession V., Snowdon township, Haliburton county, and near Irondale on the I. B. & O. Ry. Assays of the ore ran:
787 }

Metallic iron	36.17	per cent.
Manganese	trace	
Phosphorus	0 02	"
Silica	45.22	"

L. B. Howland, Irondale, Ont.

788 }
789 } Magnetite. Howland mine, lot 26, concession IV, Snowdon township, Haliburton county. Samples of the ore assay :—

Metallic iron	61.48	per cent.
Alumina	0 85	"
Phosphorus	0.01	"
Sulphur	0.06	"
Lime	3 83	"
Magnesia	2.66	"
Silica	7.71	"

H. S. Howland, Irondale, Ont.

790
791 } **Magnetite (titaniferous).** Pine lake mine, lot 35, concession IV, Glamorgan township, Haliburton county. Samples of the ore assay :—

Metallic iron	53 60 per cent.
Manganese	0 58 "
Alumina	0.76 "
Phosphorus	0 017 "
Sulphur	0 084 "
Titanium	8 11 "
Carbonite lime	0 73 "
Rock matter	12 22 "

C. J. Pusey Estate, Irondale, Ont.

792
793 } **Magnetite.** New York mine, lot 27, concession XV, Glamorgan township, Haliburton county. Samples of the ore assay :—

Metallic iron	70.38 per cent.
Sulphur	trace
Titanium	trace
Rock matter	2.74 "

C. J. Pusey Estate, Irondale, Ont.

795 **Magnetite.** New Find mine, 7 miles east of C. O. Ry. in Mayo township, Hastings county. The property has been recently opened up and shipments made to the Hamilton, Midland and Deseronto furnaces and to the Radnor Forges, Quebec.

H. C. Farnum, Eldorado, Ont.

796 **Magnetite.** Spragge mine, 7 miles east of C. O. Ry. in Mayo township, Hastings county. Recently opened up and shipments made to the several Ontario smelters.

H. C. Farnum, Eldorado, Ont.

797 **Magnetite.** Child's mine, 12 miles east of L'Amable Station, C. O. Ry. in Mayo township, Hastings county. Recently opened up and shipments made to Ontario smelters.

H. C. Farnum, Eldorado, Ont.

802 **Magnetite.** Lot 32, concession XIII, Perry township, Parry Sound District.

M. Ryan, Kearney, Ont.

832 **Magnetite.** Blairton mine, lot 8, concession I, Belmont township, Peterborough county. Worked a number of years ago. One of the old excavations in ore measures 150 by 250 feet on surface by 300 feet deep. The ore was used for charcoal iron. An analysis gives :—

Iron	64 26 per cent.
Phosphorous	trace
Sulphur	00.04 "

The Pearce Company, Limited, Marmora, Ont.

163
186 } **Magnetite.** Lot 25, concession IV, Snowdon township, Haliburton county. Outcrops of magnetite occur on the property at intervals for a distance of nearly three-quarters of a mile on high ground overlooking the I. B. & O. Ry.

T. D. Ledyard, Toronto.

440 **Magnetite.** Lot 27, concession IV, Snowdon township, Haliburton county.

Bureau of Mines.

447 **Magnetite.** Lot 31, concession IV, Snowdon township, Haliburton county.

T. D. Ledyard, Toronto.

563 **Limonite (yellow ochre).** Lot 5, concession IV, Darling township, Lanark county. Property owned by Wylie & Barnes.

Bureau of Mines.

948 **Magnetite.** Bathurst township, Lanark county.
H. Code, Perth, Ont.

948a **Magnetite.** Boyd Caldwell mine, on E. ½ lot 16, concession IX, Bagot township, Renfrew county, and 2 miles from Calabogie, K & P. Ry. Specimen weighs 1,800 lbs. and was taken from 17 feet depth in shaft. The surface outcroppings on the property point to the probability of a very large deposit of magnetite ore.
T. B. Caldwell, Lanark, Ont.

MICHIPICOTON.

This region has sprung into prominence since 1898 principally on account of its iron deposits, the chief of which is now known as the Helen mine, owned by the Lake Superior Power Company. This property was opened up in the above year with unexpectedly large showings of ore, and since then the most energetic activity has been displayed by the operators in developing this and other deposits, in building a railroad 12 miles to Michipicoton Harbor, and in erecting extensive ore docks by which the ore is loaded into the steel vessels. The railroad, the Algoma Central, is being continued beyond the Helen to Goetz lake where the Josephine iron property is being explored. The vessels owned by the company numbered four last year, each of 2,000 tons capacity, and it is reported that four more similar ships are this season to be added to the fleet and the docks enlarged accordingly. Shipping from the Helen mine began during the first week in July, 1900, continuing steadily until the end of navigation, the boats making round trips about once a week from Michipicoton Harbor, shipping all the ore to the blast furnaces at Midland, Ont.

The Helen mine is situated on Boyer lake, a small body of water a mile and a half north of Wawa lake. The ore deposit consists of red and brown hematite, the ore rising as low cliffs above the lake and probably running for some distance below water. The ore is hard and generally dark steel gray in fresh surfaces, but some parts are brown or yellow or red. It is very pure in appearance showing no pyrite and in fact few other foreign elements, though some brecciated fragments of sandstone and chert occur on the north side. The surface of the deposit has so far been stripped over an area of about 500 by 600 feet, its highest point being 94 feet above the lake. A diamond drill explored it to a depth of some 200 feet passing through ore from top to bottom. It is thought that this mass of brown hematite originated from decomposition of the great masses of pyrites in the soft sandstone which decayed away leaving the lake basins, such as this, with high barren hills surrounding. Other very large deposits of pyrites in sandstones occur in less favorable situations for decomposition close to the Helen mine, so that the above surmise is probably correct.

The Algoma Commercial Company is also developing other iron properties, the most important of which are the Josephine on Goetz lake and McDougall's mine on Iron lake, Dog river, and the Frances, all of which are as yet in the prospect stage

Other companies are exploring iron deposits in this region, the largest outfit being that of Picands, Mather and Co. of Cleveland, who are working west of Iron lake.

White river, which by a chain of lakes connects with Dog river, is the site of prospecting operations for iron ore, the deposits being represented in the exhibit by specimens contributed by Mr. Robert Murray and Mr. W. H. McDougall, both of White River.

1, 21 Limonite and hematite. Helen mine, Boyer lake, from the surface.
Bureau of Mines.

102, 103 Hematite. Helen mine, Boyer lake.
Bureau of Mines.

192 Hematite. Paint Creek property, near White River, C P. R.
W. H. McDougall, White River, Ont.

373 Hematite. Iron Lake mine, Iron Lake, Dog river, about 30 miles south of White River, C. P. R. Development work is being carried on by tunneling. These samples are from the best bands that were crosscut by the tunnels. Operated by Pickands, Mather & Co., Cleveland, Ohio.
Robt. Murray, White River, Ont.

880, 953 Hematite Helen mine.

955 Hematite. Frances mine.

957 Siderite Helen mine.

963 Diamond drill cores From holes bored in the Helen ore body.

962 Pyrite

These specimens represent the different iron properties belonging to this Company. The Helen mine is worked as an open cut, as the ore body lies but a few feet below the surface soil. The solid hematite is loosened by dynamite and then loaded on both surface and aerial trams to be conveyed to crushers having a combined capacity of 200 tons per hour. These discharge into 50-ton steel railway cars which take the ore to the Michipicoton Harbor docks to be loaded into the vessels for transportation to the furnaces. About 62 000 tons were shipped last season, but this season it is expected that 3,000 tons per day will be mined.

Typical analyses of Helen ore are:—

Iron	56.19	per cent.
Phosphorus	0 056	"
Sulphur	0.061	"

The following are from the main red ore body:—

Sample.	Iron.	Phosphorus.	Sulphur.	
No. 1	62.75	0.064	0 020	per cent.
No. 2	62.46	0 047	0.025	"
No. 3	61.00	0.071	0 042	"

The Lake Superior Power Co., Sault Ste. Marie, Ont.

956 Hematite Josephine mine, about 24 miles north of Michipicoton Harbor.

Typical analyses of Josephine ore are:—

	Iron.	Phosphorus.	Sulphur.	
No. 1	60 37	0 015	0.018	per cent.
No. 2	58 38	0.031	0 057	"
No 3	64 45	0.028	0.038	"

The Lake Superior Power Co., Sault Ste. Marie, Ont.

Thunder Bay.

Iron has been known to exist in this region from the earliest time of its exploration. In the vicinity of Port Arthur the iron occurs as magnetite. Farther west on the Mattawin range, lying along the Mattawin river, the bodies are composed of hematite, fine grained and interbanded with jasper. The ore is low grade. Deposits have been found here measuring 400 feet across and a quar-

ter mile in length. Practically the only work so far done on this range has been in exploration by diamond drills and this has been progressing for the last two years.

1a Hematite. Port Arthur district.
Graham & Horn, Port Arthur, Ont.

54 Hematite.
33, 62a } Magnetite and hematite.
Mattawin range, hill No. 7. Mattawin river, west of Port Arthur.
Bureau of Mines.

62 Magnetite and hematite. Mattawin range, hill No. 8. Mattawin river, west of Port Arthur.
Bureau of Mines.

65 Magnetite. Location R 526, Greenwater lake, east of Moss township, and just south of C. N. Ry.
Bureau of Mines.

99 Hematite. Black Sturgeon lake, near lake Nipigon.
J. F. Whitson, Toronto.

739 Specular hematite.
737 Hematite.
Echo lake property, Thunder Bay district.
P. C. Campbell, Sault Ste. Marie, Ont.

1254, 1256 } Hematite. From a property near Nipigon, Lake Superior.
Collection of F. N. Gibbs, Port Arthur.

The Atikokan Region.

The iron range in this locality is fairly well defined on the surface, extending east and west along the course of the Atikokan river, Sapawe lake and Whiskey Jack creek for a distance of 20 miles. Locations for iron have been acquired over the whole of this stretch, but until this spring no systematic development could be undertaken on account of the difficulty of transportation owing to the distance from railroads. Now, however, that the new O.R.R. Ry. runs along and through the locations from end to end, considerable diamond drilling has been done on the deposits on Whiskey Jack creek, and it is expected that another syndicate will undertake similar explorations this spring on locations west of Sapawe lake.

The iron occurs as magnetite, exceedingly hard and massive and as a rule not very coarse. The ore bodies lie with east and west strike and vertical dip between walls of green trap rock, sometimes slate-like, and again very finely schistose and light colored. On one of the many hills or "iron mountains," the only one as yet explored, the magnetite occurs solid in parallel bands from a stringer to 25 feet or more wide, separated by eruptions of green trap as wide or wider than the ore bodies. Some of the smaller bands at the outside are more or less intermixed with the trap and also contain more pyrites with occasionally some chalcopyrite and pyrrhotite than do the inner veins. The magnetite bodies are pure, save for the uniform dissemination throughout of a very small percentage of finely granular iron pyrites.

The property which has been developed sufficiently to allow of the above description is the McKellar mine. It is here that the diamond drills have been in operation, and from here also the only samples of this iron range have been obtained.

390, 746, 763, 871 **Magnetite.** Location E 10, Atikokan range, Atikokan river, Rainy River District. Tunnelling and diamond drilling done recently to explore the deposits.

McKellar Bros., Port Arthur.

Other Localities.

From lake Temagami, northern Ontario, some specimens have been sent representing iron deposits recently discovered there on which as yet no development work has been done. The iron occurs in bodies of magnetite interbanded with red jasper.

On the Pic river, about four miles north of Peninsula Harbor, Lake Superior, other magnetite exposures have been explored during recent years, but all on the surface. It is the intention of the owners, the Wiley Bros. of Port Arthur, to undertake diamond drilling and tunnelling in the deposits.

56 **Magnetite.** Lots 13 and 14, concession VI, Jaffray township, Rainy River District.
Bureau of Mines.

265 **Magnetite**
63 **Magnetite sand** Four miles east of Peninsula Harbor station, C.P.R., north shore Lake Superior.
Bureau of Mines.

275, 309 **Hematite.** From northern Algoma.
Collection of J. F. Black, Sudbury.

274 **Specular hematite.** Black Hawk property.
Collection of J. F. Black, Sudbury.

314 **Magnetite.**
290 **Hematite.**
From Hess township, Algoma District.
Collection of J. F. Black, Sudbury.

303 **Magnetite.** Algoma District.
Collection of J. F. Black, Sudbury.

306 **Hematite.** Strathcona mine, Sudbury District. From the surface.
Collection of J. F. Black, Sudbury.

322 **Hematite.** Hematite mine, Sudbury district.
Collection of J. F. Black, Sudbury.

327 **Magnetite.** Location W D 276, 5½ miles from Nemogasenda station, main line C.P.R. Samples assay 68 per cent. iron.
Wm. McVittie, Toronto, Ont.

491 **Hematite.** Wallace mine, on north shore Lake Huron, Algoma District.
Thos. Frood, Little Current, Ont.

935 Magnetite. Lots 14, 15 and 16, concessions V and VI, Zealand township, Rainy River district. Half a mile from the O. P. Ry. tracks and 6 miles northwest of Wabigoon. No development work has been done yet, but the deposit of magnetite outcrops at many points over a distance of half a mile. An assay of the material gave 67.5 per cent. iron.
Campbell, McRae and Monks, Wabigoon, Ont.

491a Magnetite. From northeast arm of lake Temagami, northern Ontario. These samples represent numerous outcroppings of magnetite on the property.
Dan O'Connor, Sudbury, Ont.

Pig Iron and Steel.

822 Iron and steel shapes.
835 Steel bars
836 Bar iron and steel shapes.
837 Steel plow beam shapes
838 Railroad bonzano plate
839 Railroad angle bars
840 Manipulated steel and iron in bars, etc.
841 Railroad tie-plates.
Hamilton blast furnace products.
The Hamilton Steel & Iron Co., Limited, Hamilton, Ont.

881 Pig iron. No. 1 Grade.
882 " No. 2 "
883 " No. 3 "
884 " No. 4 "
885 " No. 5 "
886 " No. 6 "
Midland blast furnace products, Midland, on Georgian Bay, Simcoe county. Shown in case along with samples of iron ore from the Helen mine, Michipicoton, from which the pig iron is made, and with specimens of limestone flux from Midland.
Canada Iron Furnace Co, Limited, Montreal, Que.

960 Pig iron and chill pigs. Made from the Helen mine iron ore.
Lake Superior Power Co., Sault Ste. Marie, Ont.

ZINC.

Although zincblende deposits are found at numerous places in Ontario, only two have as yet been brought to a shipping basis. One is situated in Balfour township, Algoma, where during 1898 several hundred tons of zinc ore were mined. The other property is the Zenith, 12 miles north of Lake Superior from Maggot River siding, 6 miles east of Rossport, C. P. R. The veins were discovered in 1879, but on account of the difficulties of transportation development of them was never pushed until 1898 when a new company took hold

and stoped out a large quantity of the ore, shipping some 400 tons of it to Belgium for treatment, the ore shipped running about 45% zinc. The road from the railway to the mine is only a winter one as 12 small lakes must be crossed. The country is so rough and rocky that it would be almost impracticable to build a summer road for this distance. It is intended to work the ore bodies to the full capacity this summer and ship during the coming winter, this time to refining works either at Hamilton, Ont. or in the United States. The ore occurs in veins apparently lenticular and up to 5 feet in width, lying in a green diorite formation. The vein filling is practically all blende, for, excepting a small proportion of sulphides of iron disseminated throughout, there is no impurity.

Exploration of this region resulted last year in several new and promising finds.

Other zinc specimens are from Hastings county and Parry Sound district.

226 Blende with argentite and galena in calcite. Badger mine, west of Port Arthur.
Bureau of Mines.

227 Blende Silver Mountain mines, west of Port Arthur.
Bureau of Mines.

117 Blende. Zenith mine, about 14 miles northeast of Rossport, C.P.R., Lake Superior.
Geological Survey.

328 Blende. Shipping ore from surface cut, of which some 400 tons were sent to Belgium in 1900.
329 Blende. From tunnel workings.
330 Blende. Large pieces from the workings; coarse grained from the surface, and fine from the tunnel about 60 feet below.
Zenith mine, 13 miles northeast of Rossport, C.P.R., north shore Lake Superior.
Grand Calumet Mining Co, Limited, Ottawa.

1252 Spelter. Manufactured from Zenith mine zinc ore.
1290 } Blende. Zenith mine.
1291 }
Collection of F. N. Gibbs, Port Arthur.

497 Blende and galena (argentiferous). Calumet island, Ottawa river. (Province of Quebec).
J. & O. Russell, Ottawa.

592 Blende. Silver Islet mine, off Thunder Cape, Lake Superior.
Bureau of Mines.

713 Blende. Hinchinbrooke township, Frontenac county. A recent discovery undeveloped.
F. P. Leushner, Cole Lake P.O., Ont.

890 Blende. Olden township, Frontenac county. A little galena is intermixed said to carry silver. Work recently started and 100 tons ready for shipment at the railroad.
Ira L. Benn, Long Lake P.O., Ont.

928 Blende and copper pyrites. Wilcox mine, Foley township, Parry Sound District.
Parry Sound Copper Mining Co, Limited, Parry Sound, Ont, and St Paul, Minn.

LEAD.

The galena specimens representing the lead mining industry are few in number, as none of the deposits have as yet reached the productive stage. The most important district is probably that of the counties of Hastings and Frontenac. The indications for lead here are promising, and more or less prospecting for this metal has been done at various times. The veins are well defined, consisting of galena in a calcite gangue, the galena being for the most part non-argentiferous. The Abbott and Hollandia mines, near Madoc, have been partially opened up and the ore tested.

Another region represented is that of Lake Temagami, northern Ontario.

8 Galena.
Bureau of Mines.

76 Galena Bedford township, Frontenac county.
J. F. Whitson, Toronto.

84 Galena and blende. Katherine mine, Hastings county.
Bureau of Mines.

241 Galena Abbott mine, Hastings county. Samples from the vein assay 86 per cent. lead with a little zinc and silver.
H. Eckert, Madoc, Ont.

272 Galena. Lake Temagami district, north of Sudbury. Owned by W. H. Cathro, Sudbury.
Collection of J. F. Black, Sudbury.

316 Galena (argentiferous) in quartz. Location B G 89, Sudbury district. Owner, J. Houston, Sudbury.
Collection of J. F. Black, Sudbury.

383 Galena. Hollandia mine, Madoc township, Hastings county.
D. E. K. Stewart, Madoc, Ont.

547 Galena (argentiferous). Silver Islet mine, Lake Superior.
Bureau of mines.

548 Galena. Ophir gold mine, Galbraith township, Algoma District.
Bureau of Mines.

549 Galena. Clarendon township, Frontenac county.
Bureau of Mines.

550 Galena Bedford township, Frontenac county.
Bureau of Mines.

497 Galena and zincblende (argentiferous). Calumet island, Ottawa river, (Province of Quebec).
J. & C. Russell, Ottawa.

556 Galena. Lots 17 and 18, concession I, Galway township, Peterborough county.
Bureau of Mines.

[9] HELEN IRON MINE, MICHIPICOTON: THE ORE BODY.

[10] HELEN IRON MINE, MICHIPICOTON GENERAL VIEW.

PLATINUM.

Sperrylite, or platinum arsenide, is found in small amounts in the gossan at the Vermilion mine deposit, Denison township, west of Sudbury. The mineral obtained by washing the gossan consists of small shining crystals, tin-white in color, but brittle. An analysis of the sperrylite from this deposit, made by Prof. H. L. Wells of Yale, gave the following results:

As	40.98
Sb	0.50
Pt	52.57
Rh	0.72
Pd	trace.
Fe	0.07
SnO_2	4.62
	99.46

Small amounts of platinum also occur in some of the nickel-copper ores of the Sudbury district, and it is probable the metal exists in these in the form of sperrylite.

260 **Sperrylite.** A platinum sand from Denison township, Algoma District. Location owned by Major Leckie, Sudbury.
Collection of J. F. Black, Sudbury, Ont.

914 **Sperrylite** A platinum sand from the Vermilion mine, Denison township, Algoma District.
Canadian Copper Co., Cleveland, Ohio.

BISMUTH.

61, 140, 141, 578 **Bismuthinite in auriferous quartz.** Mikado mine, Shoal lake, Lake of the Woods. Occurs throughout the ore chute of the vein with the gold and is usually associated with high values of the latter. The mineral is not saved, as it is found in small quantities only.
The Mikado Gold Mining Co., Limited, London, Eng.

ANTIMONY.

551 **Stibnite** From Garden river, near Sault Ste. Marie, Algoma District.
Bureau of Mines.

MOLYBDENUM.

This mineral resembles graphite very closely but is heavier and rather lighter in color. It is found in numerous localities in Eastern Ontario. It is used in the manufacture of molybdic acid and as an alloy in special qualities of steel.

86 Molybdenite **Frontenac county.**
Bureau of Mines.

587 Molybdenite. **Lot 3, concession VIII, Miller township, Frontenac county. This specimen is typical of numerous other occurrences in various parts of Ontario, from east to west, but no mining for the metal is being done.**
Bureau of Mines.

MINERALS APPLICABLE TO MANUFACTURES.

IRON PYRITES.

There are at present several mines shipping pyrites to be treated at chemical works for the production of sulphuric acid. They are situated in the counties of Hastings and Renfrew and in Thunder Bay district. Other properties have made shipments for test purposes and there are numerous deposits still under exploratory development in various parts of the Province.

18 **Pyrite.** Eastern Ontario. Shows an intermixture of the mica schist in which such deposits of sulphides are often found.
Bureau of Mines.

175 **Pyrite.** Burnsides mine, Hastings county. About one quarter of a mile from C. O. Ry. and 3 miles north of Eldorado. The ore contains about 46 per cent. sulphur and is shipped to the Nicholls Chemical Co., New York, where some 4000 tons have already been treated.
Nicholls Chemical Co., New York, N.Y.

245, 359 **Pyrites and marcasite.** Lebarge mine, Hastings county. Assays of samples from the deposit give 44.84 and 48 per cent. sulphur.
J. E. Harrison and S. Wellington, Madoc, Ont.

250 **Pyrite.** Meridian bay, Eagle lake, Rainy River District.
Fred. Blackie, Vermilion, Ont.

317 **Pyrite.** James bay, northern Ontario.
Collection of J. F. Black, Sudbury, Ont.

377 **Pyrite.** Leo mine, locations X 590 to 597, township 80, Thunder Bay District. Deposit some 120 feet wide, running across the locations. The mine is 3 miles from C. P. Ry. line and near shore of Lake Superior.
W. T. Hunter Emory, Toronto.

381 **Pyrite** Kellar's Bridge property, Madoc township, Hastings county. Shipping ore to Chemical Works in New York for the manufacture of sulphuric acid.
Z. H. Jarman, Madoc, Ont.

564 **Pyrite.** Lot 5, concession IV, Darling township, Lanark county. Owned by Wylie & Barnes.
Bureau of Mines.

157, 831 **Pyrite.** Davis Sulphide mine, on Brulé creek, one quarter of a mile from Kaministiquia river, Conmee township, Thunder bay District. A large deposit of intermixed trap rock and amorphous iron pyrites now being developed.
Davis Sulphur Ore Co., New York, N.Y.

4, 4a **Pyrrhotite.** Sudbury district.
Bureau of Mines.

66 **Pyrrhotite and pyrite.** Split Rock Rapids, Missanabie river, northern Algoma District.
Bureau of Mines.

71 Pyrrhotite. Lot 12, concession V, Widdifield township, Nipissing District.
Wm. Williams, Toronto.

90 Pyrrhotite Travers mine.
Bureau of Mines.

162 Pyrrhotite. Handy Transport mine, alongside C.P R. tracks, 2 miles west of Rossport, Lake Superior. A large body of sulphides of iron said to carry small values in gold and silver.
John Bowman, Rossport, Ont.

803 Pyrrhotite. Lot 32, concession XIII, Perry township, Parry Sound District.
M. Ryan, Kearney, Ont.

MISPICKEL

The manufacture of arsenic from the numerous deposits of arsenical pyrites is a growing industry. Many years ago furnaces were erected and operated near Marmora, Hastings county, but as they proved inefficient and the demand was limited, production ceased. A new plant has been installed by the Canadian Goldfields, Limited, at the Deloro mine and a regular output is being maintained.

Mispickel has recently been discovered in several new localities in Ontario,—for example on lake Temagami and west of Lake of the Woods.

39 Mispickel. Consolidated mine, Marmora, Hastings county.
Bureau of Mines.

105 Mispickel Deloro mine, near Marmora, Hastings county.
Bureau of Mines.

170 Mispickel in quartz James mine, Hastings county. The ore carries about $2 00 gold per ton besides the arsenic.
J. James, Actinolite P.O., Ont.

279 Mispickel Davis township, Nipissing district. Locations owned by Great Lakes Copper Co., Sudbury.
Collection of J. F. Black, Sudbury, Ont.

351 Mispickel and pyrite Locations X 776 and 777, near Schreiber, north shore of Lake Superior. Samples of the deposit assay high in sulphur—one gives 60 per cent.
Collection of the Mines Contract & Investigation Company of Toronto, Limited.

382 Mispickel. Wollaston arsenic mine, Wollaston township, Hastings county.

397 Mispickel. Gatling and Gawley mines, Hastings county. A large amount of development is going on at these mines. The mispickel ore contains gold and is being treated in a 10-stamp mill on the first-named property.
The Atlas Arsenic Company, Limited, Deloro, Ont.

711 Mispickel. Gawley prospect, Huckleberry Hills, just east of Deloro mine, Hastings County. Recently discovered. Carries gold also. Assays made on samples are as follows :—

Sample.	Gold.	Silver.	Arsenic.
No. 1.....	$6.60	$0.50 per ton	12 to 18 per cent.
No. 2.....	5.80	1.75 "	12 to 18 "

Andrew Gawley, Malone P.O., Ont.

96 **Mispickel.** Richardson Mine, Marmora, Hastings county. Some of the first arsenical pyrites discovered in this district.
J. F. Whitson, Toronto.

929 **Mispickel concentrates.** From which arsenic is manufactured, the gold contents having been extracted in the leaching tanks by the bromo-cyanide process.

929a **Mispickle concentrates after calcination.** The arsenic is removed by roasting.

929b **Crude arsenic.** Various grades, including crystals.

929c **Refined arsenic.** The pure, white product (As_2O_3) in both powder and crystals.

Deloro mine, Marmora township, Hastings county. The products of the arsenic works at this mine.
Canadian Goldfields, Limited, Deloro, Ont.

APATITE

The mining of apatite or phosphate of lime for use in the manufacture of fertilizers constituted a few years ago an important industry in Ontario, but since the opening up of the lower grade but more cheaply mined deposits in the southern United States, the business has practically ceased. The output for the last two years was but a few hundred tons, and most of this was obtained as a by-product in mining the associated mineral, mica. The grade of mineral is high, the first class running over 80 per cent. of phosphoric acid. The chief phosphate district may be said to lie in the form of a belt which crosses the counties of Leeds, Lanark, Frontenac, Addington and Renfrew, 100 miles in length and 50 in average breadth. Both in quantity and quality the mineral in this region exceeds that of any other country. It occasionally occurs in magnificent crystals several feet in length, of fine color and lustre, found in the Grenville series of the Laurentian rocks.

391 **Apatite.** Lot 18, concession IX, Templeton township, on the Ottawa river, Province of Quebec.
School of Practical Science, Toronto.

579 **Apatite.** Lot 13, concession X, Loughboro township, Frontenac county.
Bureau of Mines.

580 **Apatite.** Otty Lake Phosphate mine. N. Burgess township, Lanark county.
Bureau of Mines.

581 **Apatite** Lanark county.
Bureau of Mines.

582 **Apatite.** Glamorgan township, Haliburton county.
J. F. Whitson, Toronto.

585 **Apatite.** N. Burgess township, Lanark county.
Bureau of Mines.

740
745 } Apatite. Lot 32, concession XII, Sebastopol township, Renfrew county.
Alex. Parks, Eganville, Ont.

950 Apatite. Lanark county.
H. Code, Perth, Ont.

535 Acid phosphate Fine.
536 Acid phosphate Medium.
537 Acid phosphate. Semi-crystalline.
538 Bone char Superphosphate.
539 Bone meal.
Illustrative of fertilizers manufactured from crude apatite.
Standard Fertilizer and Chemical Co., Smith's Falls, Ont.

STRONTIUM

366 Celestite Lot 7, concession X, Bagot township, Renfrew county. A surface sample. Vein about 12 feet wide on the surface and traceable for several hundred feet. Within three miles of the K. & P. R. R.
H. Robinson, R. McGregor and W. Yuill,, Calabogie, Ont.

583 Celestite Lot 2, concession VIII, Lansdowne township, Leeds county.
Joshua Legge, Gananoque, Ont.

123 Celestite Lot 13, concession IX, Methuen township, Peterborough county.
J. B. McWilliams, Peterborough, Ont.

SALT

The salt industry is expanding steadily, limited only by the demand. Some fifteen firms are operating at various points in the counties bordering the southwestern shores of Lake Huron and along the St. Clair and Detroit rivers from Kincardine to Windsor. The mineral is produced by pan evaporation of brines pumped from wells drilled to the underlying salt beds of the Onandaga rocks, which are of Upper Silurian age.

In 1876, at Goderich, Mr. Attrill made a diamond drill bore to a depth of 1517 feet and discovered the existence of six beds of rock salt, as follows:—

Rock salt.	Thickness. ft.	in.	Depth. ft.	in.
1st bed	30	11	1027	11
2nd "	25	4	1085	4
3rd "	34	10	1127	0
4th "	15	5	1223	0
5th "	12	6	1243	6
6th "	6	0	1385	0

☞ The beds are not all alike in purity, the first being scarcely suitable for mining, while the second is remarkably pure and the third nearly as good. The two latter, which together measure over 60 feet, are separated from each other by a stratum of less than 7 feet, and for practical purposes may be regarded as one great workable mass. It is estimated that the yield from the best white layer, which is 10½ feet thick, will be 880,000 bushels to the acre.

The production of salt for the last three years is as follows:—

Year.	Tons.	Value.
1898	59,385	$278,886
1899	56,375	317,412
1900	66,588	324,477

830 **Brine.**
830a **Fine salt.**
830b **Coarse salt.**
830c **Butter salt.**
830d **Extra coarse salt.**
830e **Cheese salt.**

Windsor salt wells. Exhibiting the crude material (brine) and the products therefrom in the different stages of refinement.

Windsor Salt Co., Windsor, Ont.

MATERIALS USED IN THE PRODUCTION OF LIGHT AND HEAT.

Petroleum is the chief mineral coming under this head, the production of it having for years formed a large industry in the Province. The products of the crude article are shipped to all parts of Canada as illuminating and lubricating oil, naphtha, gasoline, paraffin, candles, etc.

Peat deposits have been opened up in different localities, but notably at Welland, where peat briquettes are manufactured. Experiments have been and are now going on with the view of determining the value of peat for use in producer and ordinary illuminating gases, etc.

Along the different rivers tributary to the Moose river and near James Bay several outcroppings of lignite have been found. They appear to be post glacial deposits, the lignite lying imbedded in layers in the clay. How extensive or deep these beds may be has not been ascertained.

PETROLEUM.

The main productive oil region in Ontario, and in fact in all Canada, is the county of Lambton, Ont. Surface oil and "gum-beds" were known to exist in the southern part of the township of Enniskillen from the time of the first settlement in western Ontario. In 1860 petroleum was first obtained by boring in the underlying rocks at this locality, which was then named Oil Springs. It was soon discovered, however, that the best oil territory was situated a few miles to the north in the same township, in the vicinity of the present town of Petrolia.

The oil producing region comprises the county of Lambton and the township of Zone in the county of Kent, and is all very level land, with a clay surface. Within these limits there are six producing fields, differing much in size and importance, each one representing a separate oil pool. These six fields with the approximate number of wells in each are given below:—

Petrolia	about	7,000 wells.
Oil Springs	"	1,600 "
Bothwell	"	150 "
Euphemia	"	90 "
London Road	"	70 "
Dawn	"	60 "

The principal fields are at Petrolia and Oil Springs, their respective production approximating 45,000 and 12,000 barrels a month.

The oil is in every case found in the Corniferous limestone of the Devonian system, and the several producing areas represent local dome structures on the main anticlines, which afford reservoirs for the accumulation of oil.

The oil obtained in Lambton county is dark brown in color, and has a gra-

vity of 31.5° to 35° Beaumé. It differs from the oils of Pennsylvania and Ohio, in the United States, in that its sulphur content is much higher. The United States crude oil does not usually contain more than 0.5 per cent. of sulphur, whereas the Canadian oil runs as high as 2½ per cent. This makes it more refractory for refining, but by modern methods it is claimed that complete elimination can be effected, and the refined oil made equal in quality the United States product.

Petrolia Field:—The producing area at Petrolia is about 2 miles wide by 12 miles long, in a direct W.N.W. and E.S.E. line. The oil-bearing strata are encountered at 460 to 480 feet from the surface in the Corniferous limestone, which is found in every case to be overlain by the Hamilton limestones and shales, the latter affording the impermeable cover required for the accumulation of the oil. The average depth of the wells is 465 to 470 feet, and the strata traversed by the drill are very similar in various parts of the field.

Oil Springs Field:—The Oil Springs field is about 800 acres in area and is more nearly circular than the Petrolia field. The two are divided by a very distinct synclinal revealed by borings, and this is unproductive of oil. Immediately beneath the drift are found the Portage shales which are underlain by the Hamilton formation. The oil-bearing stratum is struck at about 370 feet from the surface. This was first opened in 1862 and has produced continuously ever since.

Of the minor pools the Bothwell field, situated in Zone township, Kent county, has at present the largest production, which amounts to some 4,000 barrels a month. It runs parallel to the River Thames and is about three miles long by half a mile wide.

The other areas, as far as proved, are small, the production of the largest being only 600 barrels monthly.

The oil refining industry was formerly carried on at London, Ontario, and Petrolia by a number of companies; these were subsequently merged into two, and in the fall of 1898, these were further consolidated into one company, which took the name of The Imperial Oil Company. The industry has now its seat in Sarnia, a town of about 7,000 inhabitants, which lies on the St. Clair river, sixteen miles northwest of Petrolia.

Petrolia, which has a population of about 6,000, is, however, the natural centre of the crude oil production. The crude oil is gathered and tanked there from the different parts of the field and sent to Sarnia. Practically all the oil is shipped from Petrolia to Sarnia by a pipe line, 16 miles long and three inches in diameter, which is owned by the Imperial Oil Company.

In the fields, the oil is pumped from depths varying from 360 to 470 feet according to the locality, by an engine which works several wells; the power is transmitted hundreds of feet by means of a very ingenious contrivance of horizontal wooden rods which actuate the walking beams of the pumps. The direction of the transmission of power is changed when needed by horizontal cranks. An engine of 50 h.p. can pump about 175 wells, each producing on an average one-quarter of a barrel per 24 hours. The oil is gathered into a central tank which varies in size with the number of wells delivering into it. From these individual tanks it is pumped to a central tank, in Petrolia, by means of pipes laid by a tanking company throughout the producing fields and for the use of which a small charge per barrel pumped is made. From Petrolia the oil is sent to Sarnia by the Imperial Company's line. The tanking company has a network of 62 miles of pipe for the purpose of gathering the crude oil from the producers' tanks into the central tank. Their line extends to Oil Springs and Oakdale.

The tanks at Petrolia are simply dug in the blue Erie clay, which is perfectly impermeable. They are lined with pine timbers, for the purpose of preventing the sides from caving in. The reservoirs, of which there are 50, have a storage capacity of 8,000 barrels each, or a total capacity of 400,000 barrels.

An idea of the importance of the industry may be obtained from the following figures:—

Production of Canadian Oil refineries for the year 1900:

Product.		Quantity.	Value.
			$
Petroleum	Imperial gal.	23,381,783	.....
Illuminating oil	" "	11,783,755	1,076,242.
Lubricating oil	" "	1,980,428	232,805.
Benzine and Naphtha	" "	1,463,599	174,346.
Gas and fuel oils and tar	" "	3,669,102	200,934.
Parrafin wax and candles	lb.	4,599,683	184,718.

401 Crude petroleum **Bothwell district.**
402 " " **Petrolia district.**
403 " " **Oil Springs district.**
404 Crude naphtha sour)
405 W W. Dist. (sour)
406 Common Dist (sour)
407 Tar
408 Crude naphtha (sweet)
409 W. W Dist (sweet)
410 Common (sweet)
411 Sour mineral seal dist
412 Sweet mineral seal dist
413 90 deod gasoline
414 76 deod gasoline
415 Stove gasoline
416 62/5 Benzine
417 60/2 Benzine
418 W. W (water white) .793
419 " " .797
420 Mineral seal
421 P. W (prime white) .802
422 " " .805
423 Light tar dist.
424 Heavy tar dist
425 Heavy treated and unpressed tar dist.
426 Heavy treated and pressed tar dist.
427 30 paraffine oil
428 Diamond paraffine
429 25 paraffine
430 Atlantic red
431 27° Gr Red Oil
432 Yellow neutral.
433 White neutral
434 Renown engine
435 Zone paraffine
436 Summer Black oil
437 Steam refined cylinder oil.
438 Alaska cylinder oil
439 Capitol cylinder oil.
440 XXXX Special marine engine oil
441 High viscosity oil
442 Eldorado castor oil.

413 Eldorado engine oil
444 Standard gas engine oil.
445 Marine valve oil.
446 Standard wool oil
447 Surprise wool oil.
448 15/20 C. T (cold test) Black oil
449 Cordage oil
450 Still wax
451 Paraffine candles 6s
452 Paraffine coach " 6s
453 Electric light " 6s (medium wick)
454 Radiant " 6s
455 Electric light " 6s
456 Dominion " 12s
457 Radiant " 12s
458 Electric light " 12s
459 Paraffine " 12s
460 Electric light " 10s
461 Granite coach "
462 Granite " 6s
463 133/36 M P (melting point) wax
464 130/33 " " " "
465 128/30 " " " "
466 123/25 " " " "
467 118/20 " " " "
468 112/15 " " " "
469 Crude scale wax.
470 Coke
471 Light Diamond axle grease
472 Dark diamond axle grease
473 Mica axle grease
474 No 0 Arctic cup grease
475 No 1 " "
476 No 2 " "
477 No 3 " "
478 No 3-1/2 " "
479 No 4 " "
480 No 5 " "

The Lambton county oil fields, situated south of Lake Huron and east of St. Clair river. The above exhibit represents the petroleum oils and the products of petroleum from this district.

The Imperial Oil Co., Limited, Sarnia, Ont.

480a Petroleum gum. From so-called "gum-beds" formed by petroleum escaping to to the surface.

Oil Springs district, Lambton County.

S. Stokes, Oil Springs, Ont.

194 Asphaltum Lot 11, concession IV, Tossorontio township, Simcoe county. During the hot summer months this material oozes up through the sand and hardens after exposure to the atmosphere. As nothing in the way of development has been done, no idea can be formed of the extent or nature of this occurence. An analysis of the pitchy material at the Belleville assay office gave:—

Moisture and volatile combustible matter ..	66.44 per cent.
Fixed carbon.....	33.07 "
Ash	0.49 "
	100.00 "

This has the composition of a natural bitumen of high quality.

J. A. Brackenridge, Mattawa, Ont.

PEAT

The peat industry in Ontario is apparently about to become of much importance. The difficulties attending the cheap manufacture of briquettes have been largely overcome, so that it appears possible to derive a cheap domestic and steam fuel from the numerous peat bogs in the Province. The Peat Fuel Syndicate of Toronto has been investigating the preparation and uses of peat in foreign countries and now is conducting experiments on Ontario peat which will tend to develop fully the commercial possibilities of the industry. These tests, as well as others being made by the Bureau of Mines, are chiefly for the determination of the value of peat as fuel and illuminating gas.

A use to which the undecomposed layers of peat are put is the manufacture of moss-litter, but this as yet is produced only in small quantities. The moss is composed chiefly of sphagnum plants of several varieties.

Throughout the entire Province there are extensive areas of this vegetable matter in the first stage of its conversion into coal. Numerous companies have been formed for the manufacture of peat fuel, but all of these so far have operated on deposits in the east end and southern peninsula of the Province.

To the south of James Bay, the northern boundary of Ontario, peat beds cover a large part of the region for many miles to the south and southwest, with practically no growth of trees upon them.

857 Sphagnum moss.
858 Moss paper.
859 Disintegrated peat.
860 Crude peat.
861 Compressed peat fuel.
Welland peat beds and works, Welland county.
Peat Development Syndicate, Toronto.

137 Peat fuel. **Beaverton Peat Works. The manufactured article like the sample sells for $3.00 per ton at the works.**
Alex. Dobson, Beaverton, Ont.

985 Peat. **Section of an Ontario peat bog, first 7 feet. The exhibit shows an ideal bog section, the fresh sphagnum moss at the surface passing through various stages of decomposition into the denser material, like incipient coal, at the bottom.**
Canadian Peat Fuel Co., Limited, Toronto.

ANTHRAXOLITE

This name has been adopted to describe the pre-carboniferous coal-like material which occurs in different parts of the Province. It shows no trace of vegetable origin, and occurs in veins and under other conditions which show that it is in all probability an alteration product of petroleum or asphalt. A variety from Thunder Bay which occurs in regularly banded veins with quartz and iron pyrites has a specific gravity of 1.43, with 94.36 per cent. fixed carbon.

The substance is also found in the Kingston district. In one case crystals of barite and other minerals which occur in a vein in Silurian limestone are coated with the material, showing that it is of more recent origin than the barite and must originally have been in the fluid state. There is a deposit of this car-

bonaceous material in the township of Balfour, 17 miles west of Sudbury, and 1¼ miles south of the Canadian Pacific Railway. It occurs in black slate in an irregular vein exposed for a length of 70 feet and is 6 to 9 feet wide. A diamond drill hole sunk for exploration found the vein at a vertical depth of 100 feet.

This coaly material may be burnt like anthracite, but generally the residue of ashes is too excessive, and this together with the irregularity in its mode of occurrence renders it of comparatively little economic importance.

15 **Anthraxolite.** Balfour township, Algoma District.
Bureau of Mines.

67 **Anthraxolite** McVittie property, Creighton township, Algoma District.
Bureau of Mines.

557 **Anthraxolite** Lot 10, concession II, Balfour township, Algoma District.
Bureau of Mines.

261, 325a **Anthraxolite**

281, 302 **Country rock from foot wall of vein.**
Gordon property, Balfour township, Algoma District. Owned by J. R. Gordon, Sudbury.
Collection of J. F. Black, Sudbury, Ont.

LIGNITE

252 **Lignite coal.** Moose river, Northern Ontario.
Bureau of Mines.

1273 **Lignite coal.** Moose river, Northern Ontario.
School of Practical Science, Toronto.

CALCIUM CARBIDE

There are three works for the production of carbide of calcium in Ontario, the third being but recently completed. The demand for the article continues to be very satisfactory. New methods are coming into use whereby apparently all possible danger is done away with in the production or employment of the acetylene gas which is mainly used for illuminating purposes.

368 **Calcium carbide.** Manufactured in Ottawa. Used for producing acetylene gas for illumination or for fuel.
The Ottawa Carbide Co., Limited, Ottawa.

368a **Ground limestone**
368b **Ground coke dust.**
368c **Limestone and coke mixture.** Ready for electric furnace for conversion into calcium carbide.
T. L. Wilson, St. Catharines, Ont.

REFRACTORY MINERALS

ASBESTOS

The asbestos deposits of Ontario have not as yet been largely worked. A good collection of specimens is shown from the Campbell mine in Madoc township, Hastings county. There are other veins of the mineral in the same county, also farther north along the Ottawa river, and in the Lake of the Woods region. The hornblende variety is more common in Ontario than the serpentine or chrysotile asbestos.

333 **Tremolite.** From near Clareview, Addington county.
Collection of the Mines Contract & Investigation Co. of Toronto, Limited.

244 **Chrysotile (fibrous serpentine).** Campbell mine, Hastings county.
J. E. Harrison, Madoc, Ont.

558 **Tremolite.** Blithfield township, Renfrew county.
Bureau of Mines.

ACTINOLITE

A section of eastern Ontario, in the counties of Hastings and Addington, embracing the townships of Hungerford, Elzevir, Kaladar and Grimsthorpe, is traversed for many miles by a band of serpentine or magnesite in which are found at frequent intervals veins of actinolite. Fibrous serpentine also occurs. No deep mining of any extent has as yet been attempted in this district. Actinolite is the hornblende form of asbestos and is used in the manufacture of fire-proof paint, roofing material, packing, etc.

70 **Actinolite.** Eastern Ontario.
J. E. Appleby, Toronto.

171 **Actinolite.** James mine, Hastings county. Ground for use in making fire-proof roofing.
J. James, Actinolite, Ont.

510 **Actinolite.** Lots 8, 9 and 10, Grimsthorpe township, concession V, Hastings county.
Robert Flynn, Mountain Grove, Ont.

524 **Actinolite.** Eastern Ontario. Small turned and polished pillar. Has been satisfactorily tested in Buffalo as a lining for blast furnaces. When dressed, as in this case, it is well adapted for indoor decorative work. It also makes an excellent fire-proof paint.
J. E. Harrison, Madoc, Ont.

611 **Actinolite.** Eastern Ontario. A rough dressed cube of radiated actinolite.
J. E. Harrison, Madoc, Ont.

658 **Actinolite.** Eastern Ontario. Small turned and polished pillar.
J. E. Harrison, Madoc, Ont.

744 **Actinolite.** Lot 15, concession XIII, Sebastopol township, Renfrew county.
Alex. Parks, Eganville, Ont.

TALC

Within the last two years some deposits of talc have been opened up in various parts of the Province, chiefly in the eastern counties. The Harrison and Henderson mines near Madoc, Hastings county, are both producers, the output being shipped to mills in New York state. Other properties in this region are as yet in the prospect stage.

In Algoma district, May township, a vein of talc has been worked to a considerable depth with apparently encouraging results.

Talc is used largely as a "filler" in the manufacture of paper and for coating the finer grades of that article, also for cosmetic and other purposes. The Ontario talc is said to be equal to the best French article.

22, 136 Talc. Township of May, Algoma District.
Bureau of Mines.

94a Talc. Eastern Ontario.
Bureau of Mines.

165 Talc. Madoc township, Hastings county. Shipments are being made from this property to New York state, where it is used in the manufacture of paper.
J. E. Harrison, Madoc, Ont.

240 Talcose schist. Harrison property, Hastings county.
J. E. Harrison, Madoc, Ont.

243 Talc. Greatrix mine, Hastings county.
J. E. Harrison, Madoc, Ont.

246a Ground talc.

246 Talc.
Henderson mine, Hastings county. The vein of talc averages 36 feet wide cutting across a dolomite formation. The talc is of fine quality, being almost entirely free from grit. Last summer about 800 tons were shipped to New York.
J. E Harrison, Madoc, Ont., and A. A. Robbins, South St., New York, N.Y.

254 Talc. Frontenac county.
School of Practical Science, Toronto.

388 Talc. F. Lee location, in May township, Algoma District.
David M. Brodie, Massey Station, Ont.

487, 505, 560a Talc. Lot 10, concession V, Grimsthorpe township, Frontenac county.
Bureau of Mines.

540 Ground talc. From material represented by Nos. 487, 505 and 560a.
Robt. Flynn, Mountain Grove, Ont.

1031 Talc. Greenish mottled, cut and polished. Lake of the Woods District.
Collection of F. N. Gibbs, Port Arthur.

STEATITE OR SOAPSTONE

The deposits of soapstone (steatite or compact talc) of the eastern townships occur in association with crystalline rocks of pre-Cambrian age. Beds varying in thickness from 1 to 16 feet are associated with serpentines, dolomites, etc., sometimes replacing one or other of these rocks. It is usually pure, but occasionally crystals of bitter-spar or actinolite are disseminated through it. The uses to which steatite may be put are numerous, such as the manufacture of fixed tubs for laundries, slate pencils, lubricants, fire-bricks, slabs for electric switch boards, roofing cement, etc.

The mining of this mineral has not progressed very far, though some apparently extensive deposits have been found and partially opened up in the counties of Addington and Frontenac and in the Lake of the Woods region.

500 **Steatite.** **Pipe Stone point, Lake of the Woods, Rainy River District. Bureau of Mines.**

511, 559 **Steatite.** **Kaladar township, Addington county. Said to be a large deposit. Joshua Legge, Gananoque, Ont.**

513 **Steatite.** **Lots 8, 9, and 10, concession V, Grimsthorpe township, Frontenac county. Robt. Flynn, Mountain Grove, Ont.**

GRAPHITE

Although graphitic shales occur at various places in Ontario, the graphite industry proper is at present confined to the eastern end of the Province near Ottawa. The deposits all lie in rocks of Laurentian age, although in Argenteuil county, Quebec, just north of Ottawa, the graphite is found in the crystalline limestones which form a prominent feature of the gneissic series of that district. Sillimanite gneiss is also closely associated with the graphite bearing rocks. In places it is so thickly impregnated with flakes of graphite, as to become a graphitic gneiss, which can often be worked as an ore of the mineral. Veins of pure graphite also occur, in which case the associated rocks are the same as found with the disseminated ore, namely, weathered gneisses and such igneous rocks as granites and gabbros. The vein graphite has sometimes a flaky structure, but is generally fibrous or columnar, the fibres running across the vein at right angles to the walls.

Investigations recently carried on with a view to ascertaining the suitability of Canadian graphite for the manufacture of crucibles proved it to be as incombustible and quite as good as that of Ceylon.

Claims are being made by manufacturers as to the value of graphite for the manufacture of inks and varnishes, and if these are substantiated this new and important use will give a stimulus to the graphite mining industry.

The most important mine at present working is the Black Donald, near Calabogie, Renfrew Co. This property has reached the stage of steady production. A fine exhibit of the Black Donald graphite may be seen forming the base

BRUCE COPPER MINES, ALGOMA DISTRICT: CONCENTRATING MILL.

[11] ROCK LAKE COPPER MINE, ALGOMA DISTRICT: CONCENTRATING MILL.

[12] DELORA MINE (GOLD AND ARSENIC), HASTINGS COUNTY: GENERAL VIEW OF MINE AND WORKS.

of the statue of "Canada" in the Ontario section of the mines building.

The production of graphite for the last three years in the province is as follows:—

Year.	Tons.	Value.
1898.....	300	$ 6,000
1899.....	1,220	16,179
1900.....	1,820	27,030

7 Graphite. Lot 32, concession XIII., Monmouth township, Haliburton county.
Bureau of Mines.

7a Graphite. Black Donald mine, lots 17 and 18, concession III., Brougham township, Renfrew county, and near Calabogie. Includes specimens of the country rock, calcite, mixed with minute grains of graphite. The refinery works are situated at Ottawa.
The Ontario Graphite Co., Limited, Ottawa, Ont.

74 Graphite. Black Donald mine, near Calabogie, Renfrew county.
Hon. Geo. C. McKindsey.

827 Graphite. Black Donald mine, near Calabogie, Renfrew county. The large blocks forming the base of the statue of "Canada" were taken from the mine for this exhibit and are excellent samples of the mineral. These measure as follows: The bottom block, 3 ft. x 4 ft. 2 in. x 30 in.; the middle block, 25 in. x 40 in. x 30 in.; the upper block, 20 in. x 20 in. x 20 in. This fairly indicates the size of the deposit. They weigh in all over two tons.
The Ontario Graphite Co., Limited, Ottawa, Ont.

361 Graphite. South half of lot 14, concession IV., Blithfield township, Renfrew county. There is a 20 foot shaft sunk on the vein and at this depth the percentage graphite in the rock has increased considerably.
Richard Bailey, Calabogie, Ont.

562 Graphite. N. Elmsley township, Lanark county.
Bureau of Mines.

761 Graphite. Lot 28, concession XIII, Dungannon township, Hastings county, near Bancroft.
T. D. Ledyard, Toronto.

1355a Graphite Lot 21, concession VI., North Elmsley township, Lanark county, the locations situated 6 miles from Perth on the C. P. Ry. and one mile from the Rideau canal. The specimens represent the crude ore which is of a high grade. It occurs as a vein varying in thickness from 15 to 20 feet and underlying about fifty acres of land as ascertained by diamond drilling, some surface samples have yielded as high as 36 per cent. pure graphite.
Dr. R. A. Pyne, M.P.P., Toronto.

1356 Manufactured Graphite. Produced from the crude graphite (represented by sample No. 1355a) from lot 21, concession VI., North Elmsley township, Lanark county. The specimens show three grades of pure graphite:—

I. Fine Flake.
II. Fine Flake graphite for crucible stock.
III. Crucible Flake.

Dr. R. A. Pyne, M.P.P, Toronto.

MICA.

The production of mica during the last two years shows very substantial increase. As an insulator of electricity it has come extensively into use and the demand continues active. The recent employment of the poorer grades as material for the manufacture of pipe and boiler coverings is advantageous to the owners of mica mines, as it furnishes them a market for a large portion of the product which hitherto was thrown on the dump heaps. The company organized in Toronto a few years ago to manufacture boiler coverings from scrap mica has now a second factory in operation in Montreal. Experiments conducted in the British Navy and by a number of railway companies in Great Britain, Canada and the United States have been so uniformly satisfactory as to leave no doubt of the value of mica as one of the best of all non-conducting materials.

The principal region in which the mineral is found includes the counties of Frontenac and Lanark in eastern Ontario. The deposits occur in rocks of the Laurentian age, the mica being for the most part phlogopite the "amber mica" of commerce. The associated minerals are generally pyroxene and apatite in a gangue of calcite or crystalline limestone.

Mica mining is carried on also in the Parry Sound district, but not with much activity, whereas in eastern Ontario the operating mines are numerous. Production and shipments are intermittent, hence the statistics of output during the last few years are probably understated.

143 Mica. McKellar township, Parry Sound District.
Bureau of Mines.

144 Mica. Land, mine, Parry Sound District.
Bureau of Mines.

249 Mica. Four different kinds used in the manufacture of boiler covering.
256 Flexible and sectional mica pipe coverings.
257 Mica covering on model boiler.
257a Mica mats.
Manufactured from mica obtained from the mica mines in Ontario.
Mica Boiler Covering Co., Limited, Montreal, Que.

384 Phlogopite. Derry mines, Quebec, located north of the Ottawa river near Ottawa, Ont. As taken from the mines for shipment.
Allan Gold Reefs Co., Limited, Ottawa, Ont.

564a Biotite. Haliburton county.
Bureau of Mines.

565 Biotite. Galway township, Peterborough county.
Bureau of Mines.

566 Biotite. Otty lake, N. Burgess township, Lanark county.
Bureau of Mines.

567 Muscovite. Madoc township, Hastings county.
Bureau of Mines.

568 Muscovite. Lot 10, concession XIV., Methuen township, Peterborough county. Specimen shows glacial striae.
Bureau of Mines.

569 Muscovite. Blue Mountain mine, Methuen township, Peterborough county.
Bureau of Mines.

716 Phlogopite. Thomas mine, near Perth Road P. O., Loughborough township, Frontenac county.
G. W. McNaughton, Sydenham, Ont.

714
715 Phlogopite Freeman mine, 7 miles east of Sydenham, Loughboro township, Frontenac county. No. 714 is a crystal free from cracks and magnetite, and No. 715 is characteristic of crystallized mica. The mica is first grade for electrical purposes. The mine has been a steady producer for a considerable time.
P. Freeman, Sydenham, Ont.

717 Phlogopite Lake Opinicon mine, between Bedford and Loughborough townships, Frontenac county. A producing mine.
G. W. McNaughton, Sydenham, Ont.

718 Phlogopite (approaching biotite). P. Byrne's mine, N. Burgess township, Lanark county. A producing property.
G. W. McNaughton, Sydenham, Ont.

719 Phlogopite (approaching biotite). Gould lake property.
G. W. McNaughton, Sydenham, Ont.

741 Biotite. Lot 32, concession XII., Sebastopol township, Renfrew county.
Alex. Parks, Eganville, Ont.

749 Mica. Trousdale mine.
D. M. Barton, Schenectady, N.Y.

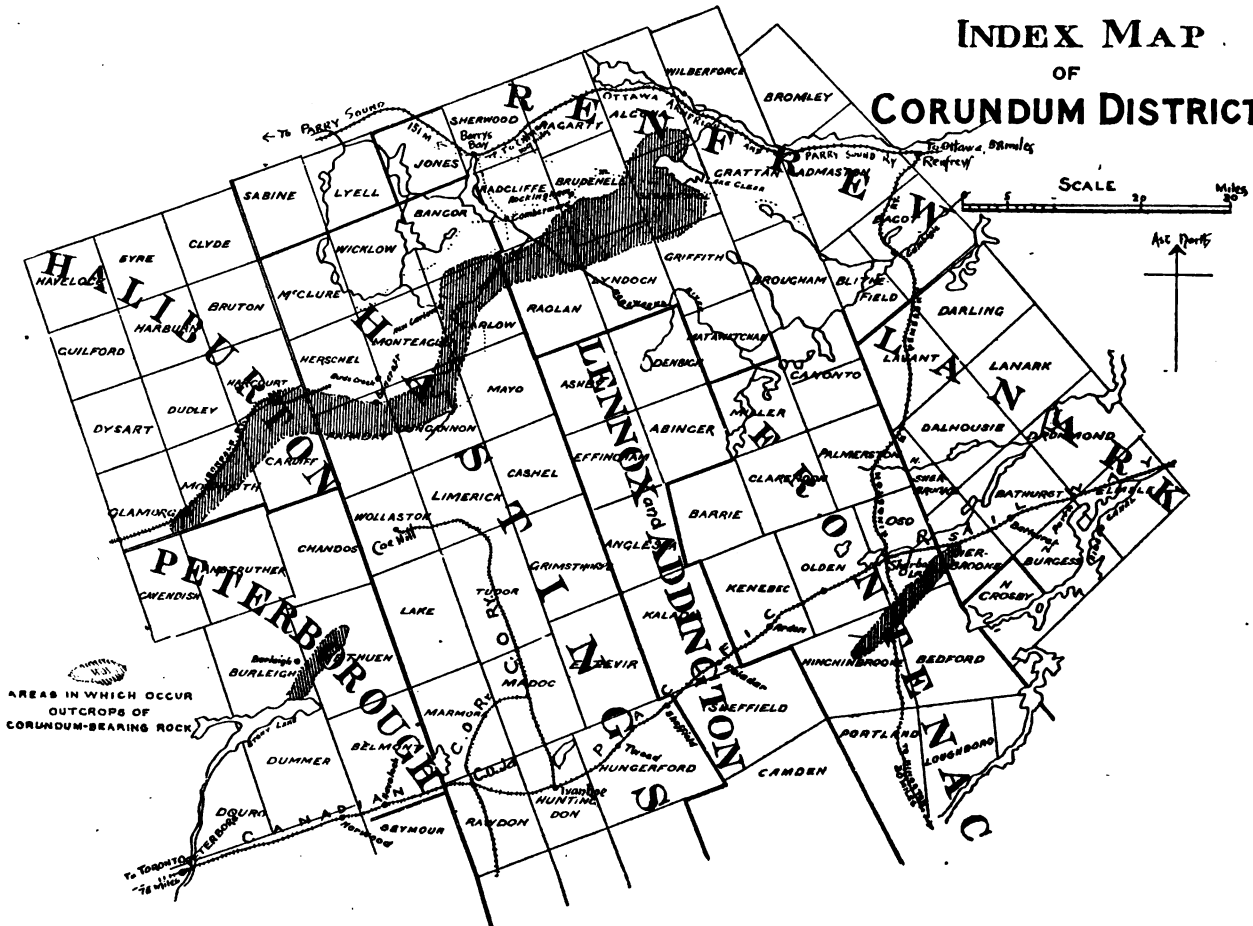
936 Muscovite. Lot 8, concession XII., McDougall township, Parry Sound District. Occurs in a vein of quartz and feldspar with well defined walls and traceable on the surface about 400 feet in length.
F. E. & E. P. Leushner, Buffalo, N.Y.

937 Muscovite. Lot 8, concession A, Ferguson township, Parry Sound District. Occurs in a pegmatite dike of varying thickness and containing crystals of tourmaline and apatite.
F. E. & F. P. Leushner, Buffalo, N.Y.

949 Phlogopite. Lanark county.
H. Code, Perth, Ont.

1250 Muscovite intermixed with quartz. Mica lake, near Oxdrift, C.P.R., Ont.
Collection of F. N. Gibbs, Port Arthur.

INDEX MAP
OF
CORUNDUM DISTRICT.



ABRASIVES

CORUNDUM

In the last few years a considerable knowledge of the corundum-bearing rocks in the eastern counties of the Province has been obtained. The accompanying index map of the corundum district shows the locations of the different areas so far discovered. It will be seen that the smaller belts are separated by a considerable distance from the larger, the main belt running through the counties of Renfrew, Hastings and Haliburton with a length of about 75 miles.

The corundum occurs as a primary constituent in a series of rocks which may be classed broadly as syenite. Numerous varieties of syenite are met with in this field both as regards size of grain and constituent minerals. In some cases the rock consists almost entirely of acidic feldspar, pink or white in color. In other cases, nepheline, mica hornblende or corundum is present. Corundum also occurs in another locality in a basic anorthosite rock. The corundum bearing rocks often occur as dykes which cut through the overlying gneisses, or at at other times they have the form of large masses which shade off into granite.

Regular work has begun at several corundum mines in the main belt, but chief among these is the Canada Corundum Company's property, 7 miles south of Combermere, Renfrew County. No underground development has been attempted and at this mine it will be unnecessary for a long period, the width of the deposit and the length of its outcrop over a high hill revealing a sufficient supply for many years which may be cheaply obtained by quarrying. The rock extracted yields from 12 to 15 per cent. of corundum. It has been found that the rock containing the mineral fairly well disseminated in the form of relatively small crystals produces the finer grade of material, and the operations are being confined chiefly to that portion of the deposit where this character predominates. This mine is the first on which reduction works have been erected. The plant consists of a Gates crusher, 2 pairs of rolls, 5 double compartment Hartz jigs, a Wilfley table and a Bartlett concentrator. The results of the mill runs have been so satisfactory that plans are under consideration for reconstruction with a greatly increased output.

The Crown Corundum and Mica Company also own a large area of corundum and mica lands in Methuen township, Peterborough county. They have demonstrated a very effective method of grinding, grading and concentrating whereby a corundum product said to be 99 per cent. pure is obtained. As a very profitable by-product the mica is extracted in small sand-like flakes which is in good demand for uses such as fire-proof paints, insulators, etc.

44 Corundum in syenite. **York Branch river deposits in Carlow, Dungannon and Monteagle townships, Hastings county. These specimens are arranged beside No. 45, on the porch of the Mines Building. They represent the other ordinary pink felspar corundrum bearing rock and consist of various sized pieces containing corundum crystals.**

Canada Corundum Co., Limited, Toronto.

45 Corundum in eleolite and nepheline syenites. **Craig mine, Raglan township, Renfrew county. This collection, which is situated on the porch of the main entrance of the Mines Building, consists of about half a ton of the white colored corundum bearing rock and crystals of corundum. This deposit in Raglan is the only one of those belonging to the company at present producing. It is mined as a quarry and is estimated to have more than a million tons of corundum in sight and is now producing over half the world's supply of the material.**

Canada Corundum Co., Limited, Toronto.

825 **Grain corundum** The product from the Craig mine, Raglan township, Renfrew county. The samples in the bottles show the corundum as it is supplied to the market, in sizes ranging from 12 to 200, for the manufacture of wheels and other abrasive and polishing goods. Assays made on the corundum give the following:

	I.	II.	III.	IV.
	per cent.	per cent.	per cent.	per cent.
Loss on ignition (moisture, combined water, sulphur and organic matter)	2 18	1.66		
Alumina	96.32	95.89	93.86	95 64
Ferric oxide	1.01	1 11	0.85	0.80
Silica	0.32	0.44	2 22	0.87
Undetermined—lime, magnesia, etc.	0.17	0 91		
Water in pure corundum	....	....	....	1 22
	100.00	100 00		

The small amount of chemically combined water is of importance as the less there is of this the harder the crystal.

Canada Corundum Co., Limited, Toronto.

826 **Corundum crystals** Craig mine and York Branch river deposits. These are selected large crystals from various points on the properties. Some of the syenite country rock and mica is still attached to most of the specimens.

Canada Corundum Co., Limited, Toronto.

824 **Sapphire in syenite.** York Branch river corundum deposits. This is the first sapphire ever found in Canada, but it is probable more will be collected while mining the corundum, the less pure variety of aluminum oxide.

Canada Corundum Co., Limited, Toronto.

826a **Corundum after fire-testing** Craig mine, Renfrew Co. These grains have been subjected to a temperature of 3,600°F. and are unaltered save in the color which has become lighter.

Canada Corundum Co., Limited, Toronto.

826b **Manufactured corundum.** Made from corundum from Craig mine, Raglan township, Renfrew county. These articles consists of two pillars of wheels, and panels of other abrasive tools such as discs, grinding cups, cones, rub-stones, whet stones, oil stones, knife sharpeners, corundum sticks, etc., are manufactured by both the silicate and vitrified processes. One wheel, which is of 36 inch diameter and 6 inch face, weighs over 600 lbs. and is the largest size of corundum or emery wheel used in America. About 85 per cent. of the abrasive wheels now made in Canada are manufactured from this corundum. The exhibits are on the porch of the Mines Building entrance and also inside in the main section.

Canada Corundum Co., Limited, Toronto, Ont.

760 **Corundum** From mining lands in Methuen township, Peterborough county. The ore is said to carry about 40 per cent. corundum and 35 per cent. mica, the balance being felspar, magnetite and hornblende.

Crown Corundum & Mica Co., Limited, Toronto.

980 **Corundum** Blue Mountain property, Peterborough county. These corundum deposits were recently acquired and nothing but prospecting has been done on them so far.

Imperial Corundum Co., Limited. L. A. Morrison, Toronto, agent.

GARNET

This mineral is an abundant constituent of many rocks throughout the Province. It is more frequently met with among the Archæan rocks in mica schists and gneisses. Beds or deposits of nearly pure garnet in compact or granular form are known in several places in Ontario, but only limited quantities have been extracted from time to time for use as an abrasive for special purposes.

12 **Garnetiferous sand** **Back bay, Shoal lake, Lake of the Woods, Rainy River district.**
Bureau of Mines.

89 **Garnet crystals.** **Butt township, Nipissing district.**
Bureau of Mines.

981 **Garnet.** **Parry Sound district.**
M. H. Bessey, Magnetawan, Ont.

BUILDING AND ORNAMENTAL STONES AND MATERIALS

The production of building materials is steadily increasing and the supply of granite, sandstone, limestone, etc., as well as of plain and pressed brick, terra cotta, lime, sand and other structural materials is limited only by the demand.

GRANITE

Immense areas of granites and gneisses of almost every known variety occur from one end of the Province to the other and quarries at several points are operating more or less actively.

692 **Grey granite** Bru'é Point, Lake Superior. A polished block.
Bureau of Mines.

705 **Red granite.** Brulé Point, Lake Superior. Polished on one face.
Bureau of Mines.

634 **Granite.** From one mile west of Ignace, C. P. R., Rainy River district. The material of which this is a dressed and polised specimen is found in immense quantities in this locality.
Bureau of Mines.

638 **Granite** McTavish township, Thunder Bay district, Lake Superior. Dressed and polished, showing a fine-grained, wine-colored stone, well adapted to ornamental work, pillars, etc. It forms the surface rock for many square miles in the hilly country to the west of Pearl River station, C. P. R.
Bureau of Mines.

639 **Red granite.** From near Kingston, Ont. Dressed and polished specimen.
Bureau of Mines.

633 **Grey granite.** From the works of T. Sydney Kirby, Ottawa, Ont. (successors to Canadian Granite Co.). Dressed and polished sample.
T. Sydney Kirby, Ottawa, Ont.

699 **Red granite.** From Kingston, Ont. The sample is a square tapering pillar, polished.
Bureau of Mines.

693, 704 **Red granite.** Renfrew county. Dressed and polished blocks from a large deposit of good quality and color.
W. C. Caldwell, M.P.P., Lanark, Ont.

SYENITE.

Syenites are often used in place of granite in ornamental and monumental work; some of the so-called granites are in reality syenites. These rocks occupy large areas north of Lake Superior and in the eastern counties. In many cases they lend themselves to the highest class of monumental work, being durable and taking an excellent polish.

610 Syenite. From beds two miles from Mackenzie Station, C. P. R, Thunder Bay District. Dressed and polished cube.
Bureau of Mines.

521 Grey syenite. C. P. R. quarries near Peninsula Station, Lake Superior. Dressed and polished; also rough blocks.
Bureau of Mines.

370 Grey syenite. Gananoque quarries. Polished block on pedestal of same material.
T. J. Stewart, Hamilton Granite Works, Hamilton, Ont.

641 Syenite. From near Mackenzie station, C. P. R., Thunder Bay District. Dressed and polished block mottled in pink colors and coarsely crystalline.
Bureau of Mines.

620 Syenite. From near Mackenzie station, C. P. R., Thunder Bay District. Dressed and polished block, rich pink in color and coarse grained.
Bureau of Mines.

596 Red syenite. Peninsula Station, C. P. R., north shore, Lake Superior.
597 Syenite
597a Syenite
598 Augite syenite.
599 Diorite.
East of Port Caldwell, C. P. R, north shore of Lake Superior. The above five samples of syenite and related diorite from the district between Peninsula Station and Port Caldwell on the north shore of Lake Superior were collected by Dr. Coleman, of the School of Practical Science. They represent large areas of these rocks, accessible and easily quarried.
Dr. A. P. Coleman, Toronto.

941 Nepheline syenite. Eastern Ontario Characteristic rock of the corundum belt traversing the counties of Haliburton, Peterborough, Hastings and Renfrew. The specimen carries corundum.
Bureau of Mines.

SANDSTONE.

Sandstone is of common occurrence throughout the eastern and southern portions of the Province. Numerous quarries are in operation producing stone of a variety of shades of color—brown, grey and mottled, etc.

604, 606, 615 } Sandstone. Dressed cubes, grey color.

601, 605, 617 } Sandstone. Dressed cubes, brown color.

607, 616 } Sandstone. Dressed cubes.
Credit Forks quarry, Caledon township, Peel county.
Carroll & Beharriell, Toronto.

688 Sandstone. Orangeville, Caledon township, Peel county. Dressed cube.
J. P. Goddard, Toronto.

706 Medina sandstone. Carroll & Vick's quarries, Peel county. Dressed block artistically carved in Romanesque style. In the centre is a shield bearing the coat of arms of Ontario. This stone was used in the construction of the Parliament Buildings in Toronto and is extensively employed in important work of that class throughout the country. In strength and ease of working it stands in the front rank among the building stones.
Bureau of Mines.

608 Sandstone. Vert island, Nipigon bay, Lake Superior. Dressed cube.
Chicago & Vert Island Stone Co., Port Arthur, Ont.

1037 Sandstone. Cut block of red stone.
1036 Sandstone. Rough piece.
Vert Island quarry, Nipigon bay, Lake Superior.
Collection of F. N. Gibbs, Port Arthur.

603 Sandstone. Dressed block, red color.
661 Sandstone. Dressed block, deep red color.
Cataraqui quarry, Pittsburg township, Frontenac county.
Cataraqui Quarry Co., Kingston, Ont.

701 Sandstone. Desbarats, on Sault Ste. Marie branch C. P. R., Algoma District. Deep red colored block, dressed edges, round face.
L. O. Armstrong, C. P. R. offices, Montreal, Que.

1035 } Sandstone. Sawyer's bay, Thunder bay, Lake Superior. Cut blocks of white
1039 } stone.
Collection of F. N. Gibbs, Port Arthur.

LIMESTONE

Limestone is an abundant rock throughout the southern peninsula and the eastern counties. There are quarries at Queenston, Merritton, Beamsville, Wolf Island (Frontenac county), Guelph, Ottawa, Belleville, Huron county and other places.

Dolomite is found in several localities: at the C P.R. quarries in Lanark; at Priest's quarry, Guelph; at Trenton, Hastings county, and in the vast beds of Devonian limestone surrounding the southern and western shores of James Bay, and also in the region of lake Wahnapitae, Sudbury district, where scattered deposits are known. None of these last have yet been exploited.

The marble exhibited has been taken in most cases from the surface, or only a few feet beneath it in the deposits. It is to be regretted that more development work has not been done, as it is a matter of experience that usually a more uniform and better quality of stone is procurable in such metamorphic formations farther down from the surface. The variety and quality of our marbles has been very favorably commented upon by architects and decorators both in Canada and the United States.

360 Limestone. Thorold quarries, Welland county. Dressed cube.
Walker Bros., Merritton, Ont.

689 Limestone. Thorold township, Welland county. Dressed and polished cube.
Bureau of Mines.

702 Limestone. Beamsville quarries, Lincoln county. Dressed block.
W. Gibson, Beamsville, Ont.

733 Limestone Crookston quarry, Lincoln county. Dressed block, dark grey color.
W. Gibson, Beamsville, Ont.

619 Limestone Queenston quarry, Lincoln county. Dressed cube.
Queenston Quarry Co., Limited, St. David's, Ont.

609 Limestone. Pelee Island, Lake Erie, Essex county. Dressed cube.
Bureau of Mines.

618 Limestone. Wolfe Island, St. Lawrence river, Frontenac county. Dressed cube.
Bureau of Mines.

614 Dolomitic limestone. Wellington county.
D. Kennedy, Guelph, Ont.

700 Limestone. Ottawa city, Carleton county. Dressed and polished block.
Bureau of Mines.

560, 828 Limestone Point Anne quarry on Bay of Quinte, near Belleville.
Phippen & Quinlan, Belleville, Ont.

23 Limestone. Quarry, Grey township, Huron county.
Bureau of Mines.

851, 852, 853, 854 Limestone. Queenston quarry, Lincoln county. These four dressed blocks form the base of the graphite column on which stands the statue of "Canada."
Queenston Quarry Co., Limited, St. David's, Ont.

887 Limestone Midland district, Simcoe county. Mined by the Canada Iron Furnace Company, for use as flux in their blast furnaces at Midland, Georgian Bay.
Canada Iron Furnace Co., Limited, Montreal, Que

247 Marble Near Bridgewater, Hastings county
J. E. Harrison, Madoc, Ont.

677 Marble. Echo lake, Thunder Bay District, a clouded variety.
Bureau of Mines.

367 Marble. Gananoque, Leeds county.
Joshua Legge, Gananoque, Ont.

710 Marble. Madoc quarry, Hungerford Marble Co. Dressed and polished by
P. W. Ellis & Co., Toronto.

665 Marble. Arnprior, Renfrew county.
Bureau of Mines.

594 Marble.
Bureau of Mines.

516 Marble. Lots 2 and 3, concession A, Mayo township, Hastings county.
J. E. Appleby, Toronto.

666 Marble Bridgewater quarry, Hastings county.
Hungerford Marble Co., Toronto.

667 Marble. Madoc, Hastings county. A turned paper-weight.
Hungerford Marble Co., Toronto.

668 Marble. Madoc, Hastings county.
Hungerford Marble Co., Toronto.

672 Marble. Madoc, Hastings county. A turned pillar.
Bureau of Mines.

654 Marble. Marmora township, Hastings county. Reported to possess excellent working qualities.
Crescent Gold Mining Co., Malone, Ont.

649, 651, 652, 655, 621, 636, 624, 625, 631 Marble. Sanford property, Barrie township, Frontenac county.
Bureau of Mines.

686, 691 Marble. Bridgewater, Hastings county. Dressed and polished by
P. W. Ellis & Co., Toronto.

644 Marble. Black Bay, Lake Superior, about 40 miles east of Port Arthur. An argillaceous marble, locally known as jasper, no doubt on account of its red color.
Bureau of Mines.

642 Marble. Thunder Bay District, 20 miles west of Wolfe River Station, C.P.R. Occurs plentifully as a horizontal bed about 20 feet thick interstratified with indurated marble of various different colors.
Bureau of Mines.

679 Marble. Thunder Bay District, 20 miles west of Wolfe River Station, C.P.R. It forms a bed 10 feet thick between other beds of the marble represented by No. 642.
Bureau of Mines.

648 Marble. Cornwall, Stormont county, St. Lawrence river. Partially argillaceous but taking a high polish. Commonly known as black marble and used for interior decorative work.
Bureau of Mines.

629, 647, 681, 659, 637 Marbles. Renfrew, Renfrew county.
Bureau of Mines.

635, 626, 627, 628, 632 Marbles. Wolf lake, Thunder Bay District. From the Nipigon series of rocks. This handsome collection of polished cubes represents material said to occur in considerable quantities. Though not susceptible to high polish, they are rich in color, the tints varying from a mellow grey, through deeper shades to light pink, purple, green and brown. Suitable for mosaics, panels, mantels and other interior decorative work. Somewhat argillaceous in composition.
Bureau of Mines.

678 "Penessie" Marble. Wolf lake, Thunder Bay District.
Bureau of Mines.

622 Marble. Bridgewater, Hastings county.
J. E. Harrison, Madoc, Ont.

612, 630 Marble. Sydenham, Frontenac county.
J. Smith & Co, Sydenham, Ont.

613 **Marble.** Healy's station, C.P.R., Thunder Bay District.
Bureau of Mines.

669 **Marble.** Lot 2, concession IV., Elzevir township, Hastings county. For making lime used in the highest class plastering work, drying with a very hard finish. An analysis gives, Carbonate of lime, - - 97 per cent.
Carbonate of magnesia 3 per cent.
J. E Harrison, Madoc, Ont.

671 **Marble.** Hungerford marble quarries, Bridgewater, Hastings county. Worked into form of a card receiver by
P. W. Ellis & Co., Toronto.

673, 674, 675, 676 **Marble.** Madoc quarry, Hastings county.
Hungerford Marble Co., Toronto.

519 **Marble.** Renfrew county.
Geological Survey.

1028, 1029, 1030 **Marble.** Polished specimens from Nipigon river, Lake Superior.
Collection of F. N. Gibbs, Port Arthur.

TRAP

This variety of rock has been found to be specially adapted to road making. When broken into various sized pieces and compactly rolled with some of the finer dust for a surface layer, it forms a firm, even roadway, having a grey color pleasing to the eye. For some years it has been extensively used for this purpose on some of the best streets in Cleveland, Ohio; last season it was shipped to that city from Bruce Mines at the rate of 1,100 tons a week on return coal boats.

A large quantity of this rock having the required grain and texture for road building exists along the north shore of Lake Huron, conveniently situated for transportation. In some cases no artificial docks would have to be built, as the water is sufficiently deep near the shore to permit the approach of large vessels.

196 **Trap or quartz diabase.** Spence Bros'. quarry, Bruce Mines, Algoma District.
Spence Bros., Cleveland, Ohio.

PORPHYRY

Porphyry frequently occurs in Ontario, generally in dykes of limited extent as compared with the areas of other useful rocks. It has not been utilized much as yet, though for compactness and excellent polish it can hardly be excelled.

680 **Porphyry.** From near Mackenzie Station, C.P.R., Thunder Bay District. Dressed and polished cube of coarse, whitish felspar crystals, marked with brown spots, in a black hornblende matrix, presenting a striking appearance.
Bureau of Mines;

SERPENTINE

This mineral is found quite widely distributed among the older crystalline rocks. It sometimes forms rock masses and is frequently mixed with crystalline limestone, the two forming together a fine decorative material.

In eastern Ontario the mineral is often associated with the so-called eozoon limestones. It is also found in smaller quantities in some of the iron ore beds of Belmont and Marmora, and in the Rainy Lake district.

244 Serpentine containing chrysotile bands. Campbell mine. Hastings county.
J. E. Harrison, Standard Asbestos Co., Madoc, Ont.

664 Serpentine vase. From Ontario serpentine.
Bureau of Mines.

JASPER AND JASPER CONGLOMERATE

Jasper conglomerate exists in mountain masses, along with the quartzite masses of the Huronian series for miles in the country north of the Bruce mines. It is a rock consisting of a matrix of white quartzite, in which are pebbles often several inches across, of a rich red, yellow, green or black jasper, and smoky or other colored chalcedony, which form a remarkably striking contrast with the pure white matrix. It is susceptible of a very high polish, and has been made into a great variety of ornamental objects, such as vases, paper-weights, etc. Some very beautiful mosaics have been produced by using the rock and included pebbles. Considering the abundance of this jasper, it seems strange that so beautiful an ornamental stone should have been so long neglected. Jasper of various colors also occurs abundantly interbanded with iron ores in the districts of Nipissing, Algoma and Thunder Bay.

14, 703 Jasper conglomerate. Bruce Mines locality, north of St. Marie river, Algoma District. Other dressed and polished pieces of this handsome stone can be seen in the exhibit of the Lake Superior Power Company. It resists the action of the weather better than granite and presents a remarkably striking appearance when finished. A considerable area in the vicinity of Bruce Mines is strewn with boulders of this material, some being very large in size. The photograph accompanying this specimen shows one of these boulders 12 feet in diameter. The formation in which they originated is found a few miles back from the north shore of Lake Huron, the outcrop being easily accessible by water or by the Canadian Pacific Railway.

In recent field work carried on by Dr. A. P. Coleman, of the Bureau of Mines, the evidence obtained placed this jasper conglomerate formation at the base of the upper Huronian.
Bureau of Mines.

392 Jasper. Location 299, adjoining location Y 5, north of Whitefish lake and west of Lake Superior, Thunder Bay District. Rough block of rock, one side polished, of a deep red color with veins of slightly different tone. Occurs in a horizontal bed lying near the base of the Animikie formation of this region.
Bureau of Mines.

87 Jasper conglomerate. Hill No. 5, Mattawin iron range, west of Port Arthur, Lake Superior.
Bureau of Mines.

571 Banded jasper and magnetite. Mattawin iron range, west of Port Arthur, Lake Superior.
Bureau of Mines.

93 Jasper interbanded with magnetite. Northeast arm of lake Temagami, Nipissing District. From the iron bodies recently discovered there.
Bureau of Mines.

BRECCIA

Brecciated rocks are to be found in numerous places throughout Ontario, but so far they have been made little use of. Certain kinds take a fine polish and present a beautiful appearance on account of the great variety in color of the fragments composing the rock.

643 Breccia. Seymour township, Northumberland county.
David Allen, Rylstone, Ont.

SODADITE

Sodalite occurs in veins of various sizes in the counties of Hastings, Renfrew, Peterborough and the district of Haliburton in nepheline-bearing rocks, frequently associated with corundum. The mineral is blue in color and takes a fine polish, which makes it useful for the fine arts and jewellery.

573 Sodalite. Lot 3, concession 4, Glamorgan township, Haliburton county.
Bureau of Mines.

574 Sodalite. Dungannon township, Hastings county.
Bureau of Mines.

754 Sodalite. Lot 29, concession 13, Dungannon township, Hastings county.
T. D. Ledyard, Toronto.

393 Sodalite. From Hastings county.
School of Practical Science, Toronto.

PERTHITE

575 Perthite. N. Burgess township, Lanark county. Polished specimen of this rare variety of felspar.
Bureau of Mines.

35 Perthite and orthoclase N. Burgess township, Lanark county.
Bureau of mines.

35a Perthite. Lots 5 and 8, concession VI., N. Burgess township, Lanark county.
Bureau of Mines.

947 Perthite. N. Burgess township, Lanark county. Unpolished specimens.
H. Code, Perth, Ont.

PORTLAND CEMENT (MARL AND CLAY)

The numerous deposits of marl and clay in Ontario afford the basis for a large Portland cement industry, which promises to expand greatly within the next few years on account of the increasing demand due to activity in building and construction work in various parts of the Province.

The Rathbun Company have a plant at Marlbank and another at Strathcona with a daily capacity of 1,800 bbls. The wet method of mixing is in use in both mills; in the latter works the cement is burned in Aalboy and Dietsch kilns built in pairs, back to back, while at Marlbank the long revolving kiln is in use. This company is at present manufacturing the largest part of the cement produced in the Province.

Both the dry and wet method of mixing is practiced at Owen Sound; also both modes of burning, kilns being in use by the Owen Sound Company of Shallow Lake and Imperial Cement Company of Owen Sound, and rotary kilns by the Grey & Bruce Portland Cement Company, situated opposite the Imperial works on the other side of the Sound.

New works on a large scale are projected at Durham and Crookston.

856 Portland cement, "Samson" brand Manufactured at Shallow Lake, near Owen Sound.

The Owen Sound Portland Cement Co., Limited, Owen Sound, Ont.

930 Portland cement
931 "Star" Portland cement.
932 Marl.
933 Slag
934 Clinker.

From the Strathcona, Ont., cement works.

The Canadian Portland Cement Co, Deseronto, Ont.

338 Clay. Location at Manilla, Victoria county, Ont. Blue clay of suitable quality for mixing with marl in the manufacture of Portland cement.

Collection of the Mines Contract & Investigation Co. of Toronto, Limited.

727 Briquettes of cement Whole and broken. Have been immersed in water for three months to a year.

728 Marl and clay, ground and mixed. Used in the manufacture of cement.

The Imperial Cement Co., Limited, Owen Sound, Ont.

730 Yellow clay. Owen Sound district, Grey county. Used in the manufacture of cement at the Imperial works, Owen Sound. An average analysis gives:

Silica	39 23 per cent.
Iron oxide	2 79 "
Alumina	12 13 "
Lime	21 61 "
Magnesia	2.69 "
Ignition loss	19 86 "
Alkalis	1.69 "
Sulphates	nil.

The Imperial Cement Co., Limited, Owen Sound, Ont.

[13] SMELTING WORKS, CANADA IRON FURNACE COMPANY, MIDLAND.

[14] SMELTING WORKS AND WHARF, CANADA IRON FURNACE COMPANY, MIDLAND.

731 **Red clay.** Owen Sound district, Grey county. Used in the manufacture of cement at the Imperial works, Owen Sound. An average analysis of this gives:

Silica	41.69	per cent.
Iron oxide	6.71	"
Alumina	14.86	"
Lime	12 80	"
Magnesia	4.96	"
Ignition loss	16.74	"
Alkalis	2.24	"
Sulphates	nil.	

The Imperial Cement Co., Limited, Owen Sound, Ont.

991 **Clay.** For the manufacture of Portland cement.
991a **Marl.** For the manufacture of Portland cement.
The Grey & Bruce Portland Cement Co., of Shallow Lake, Limited, Own Sound, Ont.

MARL

Extensive beds of marl are found at Shallow lake and Durham in the county of Grey, at Lakefield in the county of Peterborough, and in the counties of Hastings, Victoria, Lennox and Addington and many other localities, varing in extent and quality, but many of them useful for cement making purposes.

24 **Marl.** Scott township, Ontario county.
Wm. Smith, Uxbridge, Ont.

24a **Marl.** Orangeville, Dufferin county.
Bureau of Mines.

77 **Marl.** Lavant township, Lanark county.
W. C. Caldwell, M P.P., Lanark, Ont.

337 **Marl.** Location at Manilla, Victoria county, Ont. An analysis of this marl runs as follows:—

Moisture	0.20	per cent.
Organic matter	1.61	"
Clay and sand	0.50	"
Lime (CaO)	53 27	"
Magnesia (MgO)	0 77	"
Iron and alumina (Fe_2O_3 and Al_2O_3)	0 59	"
Alkalis	trace	
Carbonic acid (CO_2)	42.60	"
Phosphoric acid (P_2O_5)	0.28	"
Soluble silica (SiO_2)	0.12	"
	99.94	"

Collection of the Mines Contract and Investigation Co. of Toronto, Limited.

525 **Marl.** White lake deposit, lot 10, concession X, near Crookstown, Huntingdon township, Hastings county. 50 feet from G. T. R. and ¾ mile from C. P. R. tracks. The deposit is 30 feet deep and there are clay deposits adjacent. The sample, which was taken from the bed of White lake, gave the following analysis:—

$CaCO_3$	96 92	per cent.
$MgCO_3$	0.31	"
Al_2O_3	0 18	"
Fe_2O_3	0.11	"
FeO	trace	
SiO_2	0.98	"
Organic matter	not estimated.	
Sulphuric acid	trace	
$CaSO_4$, $MgSO_4$	trace	
Alkalis (K_2O and Na_2O)	not estimated.	
Total estimated	98 50	per cent.

Geo. Thompson and S. Masson, Belleville, Ont.

729 **Marl.** Owen Sound, Grey county. Used in the manufacture of cement at the Imperial works, Owen Sound. An average analysis of this gives:—

Silica	1.43	per cent.
Iron oxide	0.18	"
Alumina	0.20	"
Lime	50 62	"
Magnesia	2.09	"
Ignition loss (carbonic acid and organic matter)	45 58	"
Alkalis	nil	
Sulphates	nil	

The Imperial Cement Co., Limited, Owen Sound, Ont.

798, 799 **Marl.** Robbins lake, near Ameliasburg, Prince Edward county.
A. Lout and Capt. Yott, Ameliasburg, P. O., Ont.

932 **Marl.** Strathcona, Hastings county. Used in the manufacture of cement at Strathcona.

The Canadian Portland Cement Co., Limited, Deseronto, Ont.

BRICKS AND TERRA COTTA

The manufacture of bricks is very extensively carried on in the vicinity of the cities and in the more thickly inhabited districts of the Province. Two sorts of clay are chiefly employed; one blue when moist, and whitish or yellowish after burning, known geologically as the Erie clay; the other of a more recent formation, brownish in the raw state, but usually burning red, and which has been designated the Saugeen clay. The Erie clay is sometimes found in beds as much as sixty feet thick, while the Saugeen clays are in thinner deposits. Both of them contain a considerable quantity of carbonate of lime. The white bricks command a higher price than the red, and are made in large quantities in a number of places between Brockville on the east, and Lake Huron on the west. In that part of Ontario between the St. Lawrence and Ottawa, bricks are usually

made from a marine clay overlying the boulder-clay, and geologically known as the Leda clay, and are always of a red color. Bricks of a superior quality and adapted for special purposes, such as street paving, are also now made from the Utica, Lorraine and other Palaeozoic shale deposits.

The chief exhibit is that of the Milton Pressed Brick Company, which has erected at one of the entrances of the Ontario section an ornamental arch of pressed brick and terra cotta.

984 **Pressed brick and terra cotta.** Milton brick works. This exhibit is erected in the form of an arch of pressed brick, with terra cotta decorations similar to what may be seen in buildings of to-day.
Milton Pressed Brick Co., Limited, Milton, Ont.

1357 **Pressed brick and terra cotta.** Beamsville brick works. This exhibit illustrates the style and material of a modern artistic window frame. The ware is manufactured by the most modern type of plant, from the highest grade and quality of shale clay.
Beamsville Brick and Terra Cotta Co., Beamsville, Ont.

LITHOGRAPHIC STONE

The most important district in which lithographic stone has been found in the Province is that including the counties of Hastings and Peterboro. At Marmora, the Laurentian rocks are overlain by about twenty feet of brownish grey and light brownish-buff unfossiliferous compact limestone, having a conchoidal fracture. Several beds of this would be well suited for the manufacture of lithographic stones, were it not for small imbedded crystals of calcite, which when abundant, render the stone unfit for this use. One of the beds, however, which is two feet thick, and of impalpable grain, affords a lithographic stone of good quality, and has been commended by lithographers who have tried it. The band to which this bed belongs crops out at intervals all the way from Hungerford to Rama townships, a distance of 100 miles.

On a sample of lithographic stone which is on exhibit from the Madoc quarry, the photos of Hon. G. W. Ross, Premier of Ontario, and of Hon. E. J. Davis, Commissioner of Crown Lands, with other transfer designs have been worked by Rolph, Smith & Co., Toronto. Also on another, from Harvey township, Peterborough county, a portrait of the Hon. G. W. Ross, the Premier, has been worked by the Toronto Lithographic Company.

662 **Lithographic stone.** Eganville, Renfrew county.
Bureau of Mines.

520 **Lithographic stone.** Lot 9, concession II, Harvey township, Peterborough county. The photograph of the Hon. G. W. Ross, Premier of Ontario, has been transferred to this specimen by the Toronto Lithographic Co.
H. T. Strickland, Peterborough, Ont.

982 **Lithographic stone.** Madoc quarry, Marmora township, Hastings county. Photographs of the Hon. G. W. Ross, Premier of Ontario, and the Hon. E. J. Davis, Commissioner of Crown Lands, have been transferred to this specimen by Rolph, Smith & Co., Toronto.
Bureau of Mines.

1032, 1033, 1034 **Lithographic stone.** Cut and polished block from Roland quarry near Port Arthur, Ont.
Collection of F. N. Gibbs, Port Arthur.

BARITE

Heavy spar or sulphate of barium is found in many parts of Ontario, both in the eastern and western districts, but probably most abundantly along the north and west shores of Lake Superior. It occurs in crystalline masses in veins, generally in rocks of the Laurentian age, and several such deposits have been worked more or less extensively. Heavy spar may be used independently as paint, but more frequently is employed for mixing with other coloring materials, especially white lead. A pigment known as "permanent white" is obtained from barite by a precipitation process, and is much finer than that prepared by the grinding method. In this form it is largely employed in the manufacture of fine wall-papers to which it gives a hard glossy surface.

590 Barite. Lot 3, concession XI, Pakenham township, Lanark county.
Bureau of Mines.

106 Barite. N. Burgess township, Lanark county.
Geological Survey.

983 Barite. McKellar Island mine on McKellar island, 19 miles south of Port Arthur, Lake Superior, Thunder Bay District. The island measures about 2,000 feet in length and 600 in width and the deposit of barite is 600 feet long, 77 feet wide and about 85 feet deep, 55 feet of the vein being above water level and well defined. The specific gravity of the material is 3.58, and an analysis of fair average samples shows 59 per cent. pure barite.
Henry Lardner, Niles, Mich.

1088, 1095, 1089 Barite.

2033 Barite with talc. McKellar mine, McKellar island, near Port Arthur, Lake Superior.
Collection of F. N. Gibbs, Port Arthur.

FLUORITE

588 Fluorite. From ore of Silver Islet mine, Lake Superior.
Bureau of Mines.

591 Fluorite. From ore of Silver Mountain mines, west of Port Arthur.
Bureau of Mines.

GYPSUM

Gypsum is found in southern Ontario in rocks of the Onandago (Silurian) age at points along the Grand river near Paris, and in the vicinity of James Bay in thick and extensive beds in the Devonian limestone along the Moose and French rivers. Only some of the deposits on the Grand river are being worked, producing a very satisfactory quality of plaster of Paris.

507 Gypsum. Haldimand county.
Bureau of Mines.

518 Gypsum. Gypsum mines, Haldimand county.
Robt. Glenny, Gypsum Mines P.O., Ont.

541 Ground Gypsum.
Bureau of Mines.

586 Gypsum. Paris beds, Grand River, Brant county.
Bureau of Mines.

589 Selenite. Moose river gypsum beds, near James Bay.
Bureau of Mines.

774, 775 Gypsum. Victoria gypsum mines.
Wm. Smith, Caledonia, Ont.

SELENITE

Selenite is found at several localities enclosed in the beds of granular gypsum, selenite being the crystalline form of that mineral, as for instance the gypsum deposits of the Grand river, southern Ontario, and of Moose river, near James Bay.

36, 584, 589 Selenite. Moose river, near James bay. From the gypsum beds.
Bureau of Mines.

FELSPAR

Felspar occurs abundantly as a constituent of the gneisses and granites of the Laurentian which occupy so great an area in eastern Canada. It is only when it is found in the coarsely crystalline pegmatitic masses or in veins by itself that the mineral can readily be obtained in sufficient purity for commercial purposes. The low intrinsic value of the product likewise restricts working to places easy of access by water or rail. The mineral is chiefly used in the manufacture of pottery and glazes, aud the different varieties of felspar appear to be equally applicable to these uses, the only requirement being that all must be free from iron and other impurities. When vitrified the small quantities of iron oxide naturally coloring some of the felspars combine with the silica and the color disappears.

The principal deposit under operation is that on Desert lake, near Verona station on the Kingston & Pembroke railway, Frontenac county, from which regular shipments are being made to New Jersey potteries. The variety of felspar in this deposit is microcline ; generally it is orthoclase.

108 Orthoclase felspar. South March township, Carleton county.
Geological Survey.

147 Orthoclase felspar. Land property near Parry Sound.
Hattie Bell Gold, Copper & Nickel Co., of Parry Sound, Limited.

494 Orthoclase felspar. Lot 11, concession IV, Clarendon township, Frontenac county.
Bureau of Mines.

545 Microcline felspar. Desert lake near Verona on K. & P. Ry., Frontenac county. This deposit is one of the largest and purest known in Ontario, and is conveniently situated for transportation. Regular shipments are made to United States, where the felspar is used for glazing pottery.
Kingston Felspar Co., Limited, Kingston, Ont.

570 Felspar. Lot 10, concession V, Miller township, Frontenac county.
Bureau of Mines.

576 Orthoclase felspar (aventurine). Sebastopol township, Renfrew county.
Bureau of Mines.

35 Orthoclase and perthite. N. Burgess township, Lanark county.
Bureau of Mines.

KAOLIN

The kaolin deposits of Ontario are limited in number so far as yet known. Several have been found in the clay lands of Northern Ontario on the Missanabie and Abitibi rivers. Kaolin is a soft, impalpable, unctuous clay, the pure variety being entirely aluminous (kaolinite) in composition, and generally of whitish color. It is formed chiefly from orthoclase felspar by the natural process of weathering and decomposition, and is in great demand for the manufacture of the finest grades of china ware and porcelain.

561 Kaolinite. Abitibi river deposit. The purest unctuous clay.
Bureau of Mines.

389 Pipe-clay. Webbwood falls, Spanish river, Algoma district. Plastic, free from iron and mostly unctuous, but contains some free silica.
Spanish Pulp & Paper Co., Limited, Massey Station, Ont.

CRYSTALS

742 Sphene in microcline felspar. Lot 32, concession XII, Sebastopol township, Renfrew, county.
Alex. Parks, Eganville, Ontario.

752 Sphene. Sebastopol township, Renfrew county.
Dr. A. P. Coleman, Toronto.

753 Zircon in calcite and augite. Eastern Ontario. This zircon is a twin crystal.
Dr. A. P. Coleman, School of Science, Toronto.

748 Calcite crystals. Sebastopol township, Renfrew county.
Alex. Parks, Eganville, Ont.

743 Augite crystals with apatite. Lot 32, concession XII, Sebastopol township, Renfrew county.
Alex. Parks, Eganville, Ont.

747 Augite crystal. Sebastopol township, Renfrew county.
Bureau of Mines.

572 Beryl and biotite mica in felspar. Sebastopol township, Renfrew county. A deposit containing beryl has been found in this township, close to the corundum belt of the region. The occurrence is of interest in that generally cassiterite (oxide of tin) is found in association with beryl. The outcrop of the deposit consists of large masses of green feldspar or amazon stone and quartz. These minerals show a rather sharp contact, and the masses of them have a diameter of several feet. Associated with them is black mica and the beryl which is imbedded in the quartz. The beryl crystals are of different sizes, being generally much elongated but with imperfect terminations. Some of the crystals have a diameter of six inches and more.

Bureau of Mines.

517 Amethyst. From north shore of Lake Superior.

Park Commissioner Chambers, Toronto.

125 Amethyst crystals with pyrite. Silver Mountain, west of Port Arthur.

Wm. Margach, Rat Portage.

1038 Amethyst.

2026 } Purple amethyst.
1093 }

Amethyst harbor, Thunder Bay, Lake Superior.

Collection of F. N. Gibbs, Port Arthur.

1231 }
2025 } Amethyst with pyrite crystals.
1092 }

1094 Amethyst with calcite crystals.

Beaver Silver mine, west of Port Arthur, Thunder Bay District.

Collection of F. N. Gibbs, Port Arthur.

MINERAL WATERS

These are somewhat widely distributed in the Province and differ greatly in their properties and composition. Accounts of these waters are given in the Geology of Canada, 1863, and in other annual reports of the Geological Survey, also in the Bureau of Mines Report for 1891. Complete exhibits are shown of the Caledonia Springs and Chatham waters.

482 **Mineral water.** Red Cross Spring, Caledonia Springs, near Ottawa. Depth in Trenton rock, 170 feet. Flow, 3 feet above ground, 22 gals. per minute; 15 feet below surface, 55 gals. per minute. Temperature, 50 degrees. Price, $1 63 per dozen. Analysis:—

Chloride of Sodium	19 90
Chloride of Potassium	.10
Bromide of Sodium	.09
Iodide of Sodium	.01
Sulphate of Sodium	.86
Sulphate of Potassium	1 05
Carbonate of Magnesium	1.06
" Lime	1.48
" Soda	4 23
" Lithia	.01
" Iron	.01
Silica	.92
Alumina	.02
Grains in 10,000 parts	29 74

The Grand Hotel Co., Limited, Caledonia Springs, Ont.

481 **Mineral water.** Duncan spring, still. Caledonia springs, near Ottawa. Price, $1.63 per dozen.

The Grand Hotel Co., Limited, Caledonia Springs, Ont.

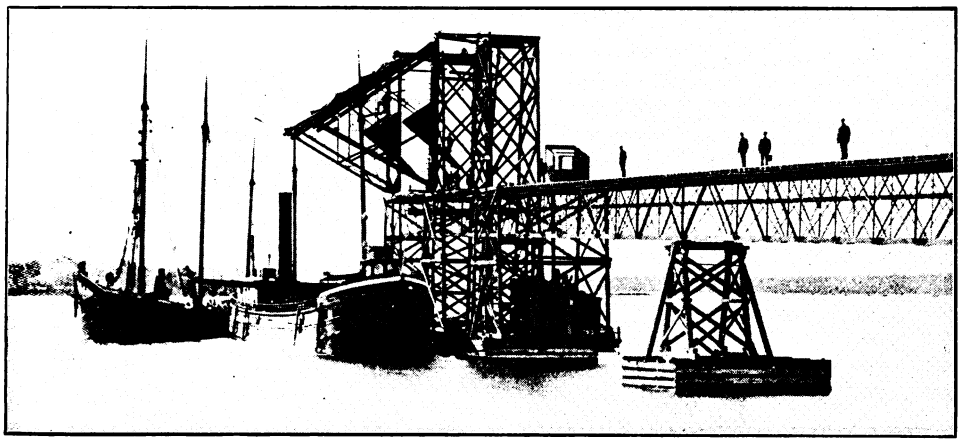
483 **Mineral water.** Duncan spring, carbonated. Caledonia springs, near Ottawa. Issues from Trenton rock, depth of source, 148 feet. Flows 8 feet above surface at rate of 4 gals. per minute. Temperature, 50 degrees. Price, 85c per dozen. Analysis:—

Chloride of Sodium	122 50
Chloride of Potassium	31
Chloride of Calcium	2.87
Chloride of Magnesium	10 34
Bromide of Magnesium	.24
Iodide of Magnesium	.02
Carbonate of Magnesium	8.63
" Lime	1.26
" Iron	trace
Silica	.22
Alumina	trace
Carbonic Acid	5.01
Grains in 10,000 parts	151.40

This water is an aperient and diuretic.

The Grand Hotel Co., Limited, Caledonia Springs Ont.

[12] A TYPICAL MINING CAMP: MIKADO MINE, LAKE OF THE WOODS.



UNLOADING PIER OF BLAST FURNACE AT DESERONTO.

[16] WATER POWERS: FLAT ROCK FALLS, UPPER SEINE RIVER.

484 **Mineral water** Saline Spring, carbonated. Caledonia Springs, near Ottawa, Ont. Issues from Trenton rock, depth of source unknown. Flow, above surface, 11 gals. per minute; 3 feet below surface, 34 gals. per minute. Temperature, 46.5 degrees. Distance from old White Sulphur Spring, 4 feet. Price, 85c per dozen. Analysis:—

Chloride of Sodium	64.41
" Potassium	.30
Bromide of Sodium	.17
Iodide of Sodium	.01
Sulphate of Potassium	.05
Carbonate of Magnesium	5.17
" Lime	1.17
" Soda	1.76
" Iron	trace
Silica	.41
Alumina	trace
Grains in 10,000 parts	73.45

Alterative, tonic and diuretic.

The Grand Hotel Co., Limited, Caledonia Springs, Ont.

485 **Mineral water** White Sulphur spring, carbonated. Caledonia Springs, near Ottawa Issues from Trenton rock, depth of source unknown. Flow, above surface, 4 gals. per minute; 3 feet below, 10 gals. per minute. Temperature, 46 degrees. Price, 85c. per dozen. Analysis:—

Chloride of Sodium	38.43
" Potassium	.23
Bromide of Sodium	.10
Iodide of Sodium	.01
Sulphate of Potassium	.17
Carbonate of Magnesium	2.94
" Lime	2.10
" Soda	4.56
" Iron	.01
Silica	.83
Alumina	.03
Grains in 10,000 parts	49.41

This water is a mild diuretic.

Grand Hotel Co., Limited, Caledonia Springs, Ont.

943 **Mineral waters.** Chatham wells, Kent county. An analysis by A. R. Pyne, M.B, Dominion Analyst, gave the following:—

	In grains per gallon—Imperial.
Magnesium Sulphate	370.140
Sodium Sulphate	331.410
Calcium Sulphate	20.120
Sodium Chloride	6120.200
Potassium Chloride	8.460
Calcium Chloride	3260.400
Iron Carbonate	2.500
Alumina (Suspended)	1.110
Silica	1.170
Sulphur, free	.200
Bromides and Iodides	traces
	10,115.610

Water contains an undetermined quantity of Carbonic Acid, and is saturated with Hydrogen Sulphide.

THERAPEUTIC PROPERTIES.—This water is strongly sulpho-saline and

should prove valuable as a cathartic and alterative when properly diluted, and should also prove very efficacious in chronic skin diseases and rheumatic troubles.

Chatham Mineral Water Co., Limited, Chatham, Ont.

486 Mineral water. Caledonia Seltzer, carbonated. Caledonia Springs, near Ottawa. Price, 70c. per dozen.

The Grand Hotel Co., Limited, Caledonia Springs, Ont.

MISCELLANEOUS

1258 Agate Specimens found on the north shore of Lake Superior near Port Arthur.

Collection of F. N. Gibbs, Port Arthur.

1232 Petrified wood "Tiger's eye." Found east of Port Arthur on shore of Lake Superior.

Collection of F. N. Gibbs, Port Arthur.

DECORATIONS

986 Plaster of Paris cast. Statue of female figure representing Canada. Sculptor, J. Lisney Banks, Toronto.

Bureau of Mines.

772 Moose head. A fine specimen from the Ottawa river region.

S. R. Tierney, Arnprior, Ont.

987a Map of Ontario and adjoining States. Showing Algoma Central Railway from Sault Ste. Marie to Hudson Bay, and Michipicoton Branch, and other lines of transportation connecting at Sault Ste. Marie. The more important economic minerals and timber suitable for pulp wood are also shown. The principal lines of communication are outlined in different colored lights.

Lake Superior Power Co., Limited, Sault Ste. Marie, Ont.

987 Map of Ontario, 18 by 22 feet. Geologically colored and showing chief deposits of the principal minerals; lines of railway built and projected; statistical information and synopsis of mining laws, enclosed in an illuminated border, the design of which includes flora and fauna typical of Ontario, coats of arms of the Province and cities of Ontario, etc. Made by Elliott & Co., Toronto.

Bureau of Mines.

PHOTOGRAPHS

1311 Hamilton blast furnace plant.
1312 General view of rolling mill.
1313 General view of blast furnace and steel plant.

Hamilton Iron and Steel Co., Limited, Hamilton, Ont.

1300 Steamer "Thrano" at ore dock in Michipicoton harbor.
1301 Michipicoton harbor.
1302 Ferro-Nickel Reduction Works, Sault Ste. Marie, Ont.
1303 Sulphite pulp mill Sault Ste. Marie, Ont.
1304 Algoma Iron Works. Sault Ste. Marie, Ont.
1305 Helen iron mine Michipicoton District.
1306 137 ton locomotive. Algoma Central Railway.
1307 Cliff. North shore of Lake Superior.
Lake Superior Power Co., Limited, Sault Ste. Marie, Ont.

1317 Machinery and portion of Bessemer converting plant. Sault Ste. Marie, Ont.
1318 Commercial docks. Michipicoton harbor.
1319 Ore docks Michipicoton harbor.
1320 Views on Algoma Central Railway.
1321 Old Block House Residence of Mr. F. H. Clergue, Sault Ste. Marie, Ont.
1322 Sulphite mill Sault Ste. Marie, Ont.
1323 Algoma Iron Works' machine shop.
1324 General view of the Lake Superior Company's works. Sault Ste. Marie, Ont.
Lake Superior Power Co., Limited, Sault Ste. Marie, Ont.

1308 Canada Furnace Company's Midland blast furnace. Midland, Ont.
1309 Canada Furnace Company's plant, showing casting house and power house. Midland, Ont.
1310 Canada Furnace Company's furnace and stoves Midland, Ont.
Canada Furnace Co., Limited, Midland, Ont.

1314 Mica covered boiler, of Toronto Street Railway Company's power house.
1315 Grand Prix diploma. Obtained at the Paris Exposition, 1900.
Mica Boiler Covering Co., Limited, Montreal, Que.

1316 Boulder of jasper conglomerate. On the beach on north shore of Lake Huron, South of Bruce Mines, Algoma.
Bureau of Mines.

1325 400-ton concentrating plant. Bruce mines, Algoma.
Bruce Mines Copper Co., Limited, Bruce Mines, Ont.

1326 200-ton concentrating plant. Rock Lake Copper mine, Algoma District, 12 miles north of Bruce mines.
Rock Lake Mining Co., Limited, Bruce Mines, Ont., and Buffalo, N.Y.

1327 Unloading pier. Deseronto blast furnace.
Deseronto Iron Co., Limited, Deseronto, Ont.

1328 Main shaft, Crown Point mine. Shoal lake, Lake of the Woods region.
1329 Stamp mill of Crown Point mine. Shoal lake.
Bureau of Mines.

1330 Burley mine. Lake of the Woods.
Bureau of Mines.

1331 Regina mine. Regina bay, Lake of the Woods.
Bureau of Mines.

1334 Mill and shaft-house of Mikado mine.
1335 Chlorination plant of Mikado mine.
1336 New shaft-house of Mikado mine
1337 Gold bricks from a Mikado mine mill-run. Mikado mine, Shoal lake, Lake of the Woods region.
Mikado Gold Mining Co., Rat Portage, Ont., and London, Eng.

1332 General view of Sultana mine.
1338 Engine and compressor room.
1339 Battery room
1340 Vanner room
1341 }
1342 } Underground view.
1343 }
Sultana Mine of Canada, Limited, Rat Portage.

1333 General view of the Keewatin Reduction works
1344 Vanner room,
1345 Aerial tram. For unloading from barges.
Ottawa Gold Milling and Mining Co, Limited, Keewatin, Ont.

1346 Rat Portage Reduction Works.
Bureau of Mines.

1347 Power house and flume pipe.
1348 Electric machinery and water wheels in power house. Hammond Reef mine, Sawbill lake.
Bureau of Mines.

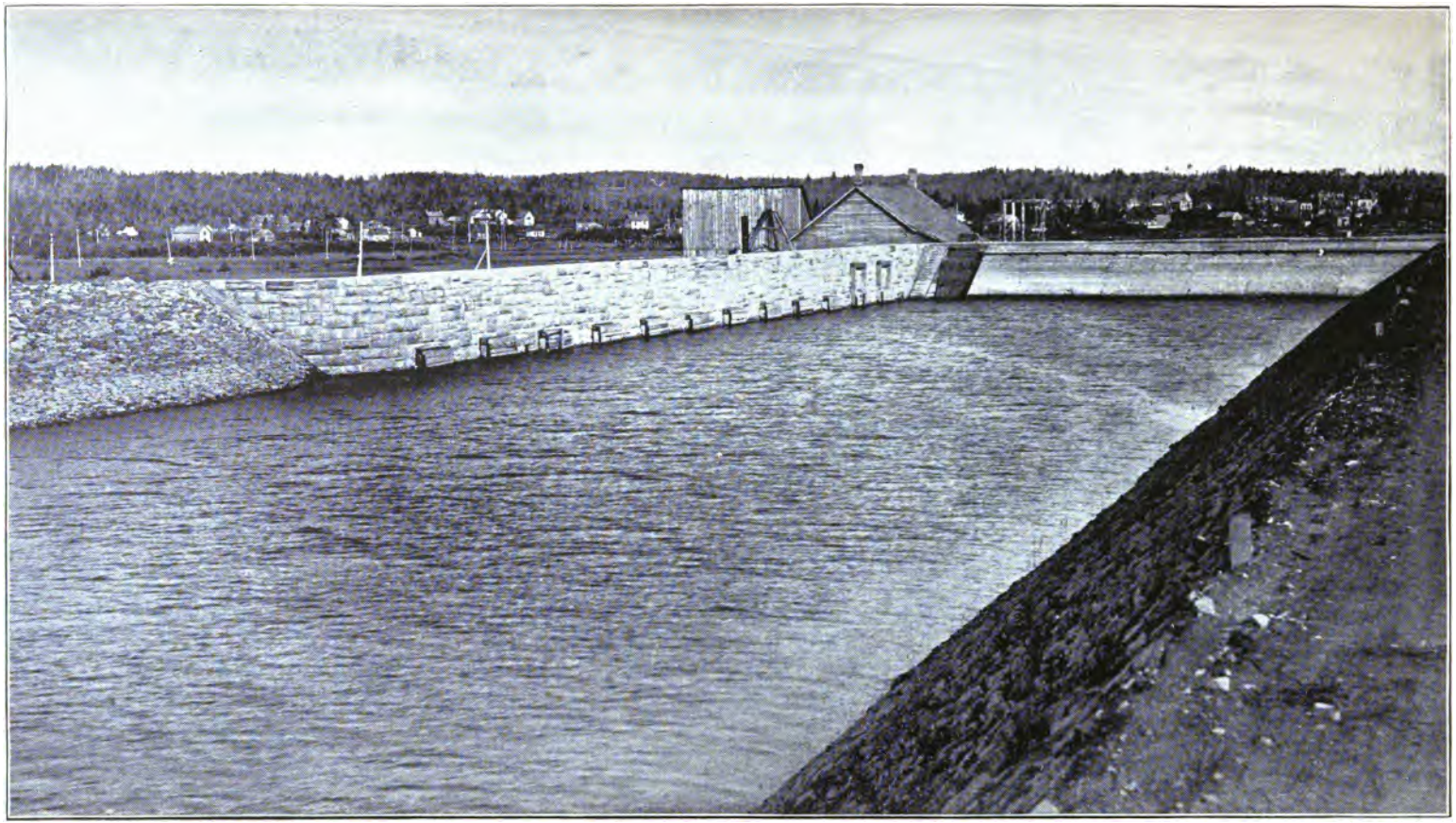
1349 Shaft-house. Big Master mine, Upper Manitou lake.
Bureau of Mines.

1350 Stamp mill. Decca mine, Lower Seine region.
Bureau of Mines.

1351 General view of the Deloro Gold and Arsenic Mine
1352 Arsenic works
Canadian Goldfields, Limited, Deloro, Ont., and London, Eng.

1353 Steep Rock falls. On the Seine river, where it enters Steep Rock lake.
Bureau of Mines.

1354 Set of views of the Ontario Smelting Works, Copper Cliff, Ont.
Oxford Copper Co., Limited, New York.



[17] WATER POWERS: POWER CHANNEL AT SAULT STE. MARIE, SHOWING POWER HOUSE.